The Communicator

May—June 2024

VE7RCAF

Celebrating the
100th anniversary of the
Royal Canadian Air Force

The Bi-monthly Journal of Surrey Amateur Radio Communications

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Our article reprint policy is on page 124

Issues appear bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote ham radio activity.

Contributions of articles and photos are welcome.

During non-publication months we encourage you to visit the Digital Communicator at **ve7sar.blogspot.ca**, which includes recent news, past issues of ***The Communicator***, our history, photos, videos and other information.

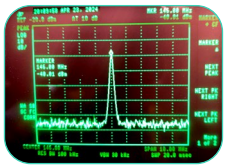
To subscribe, unsubscribe or change your address for e-mail delivery of this electronic journal, notify **communicator @ ve7sar.net**

If you find ***The Communicator*** worthwhile, regular readers who are not SARC members are invited to contribute a donation towards our Field Day fund via PayPal.

SARC maintains a website at **www.ve7sar.net**

DEPARTMENTS

IN THIS ISSUE



In this issue Kevin VE7ZD provides a double-header with a look at test equipment and Part 1 of CW decoders.

Dmitry VA7DVO got his hands on a 3D printer and he has transformed our 5-band linked dipole project into a thing of beauty.

Peter Vogel VE7AFV introduces you to decoding signals from a geostationary weather satellite.

...and so much more!

QSK?

Do you have a photo or bit of Ham news to share? An Interesting link?

Something to sell or something you are looking for?
eMail it to communicator at ve7sar.net for inclusion in this publication.

Another two months and another issue of The Communicator is completed. We appreciate your feedback and we are certainly pleased that so many have remarked on the quality of our electronic journal. We are fortunate that we do not have to rely on advertising income to bring you this publication. It is and has always been the work of volunteers and guest writers, and those who permit us to use excerpts from their own websites, blogs and publications.

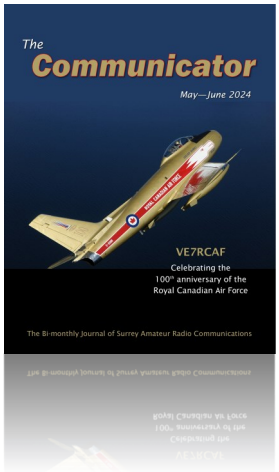
Our reach is worldwide. We have been downloaded from in excess of 145 countries, in numbers that we never dared imagine, but well in excess of 10,000 times, and up to 22,000+ times for some issues.

I am often asked about the publication and what it takes to put an issue together. As editor, I am constantly on the hunt for interesting topics, stories, photographs and other tidbits about our hobby and associated subjects, to share with you. Fortunately, much of the content is now contributed, sent to me by authors sharing their work to a wider audience. I return the favour by listing the source and a link to their site, and I hope readers take the time to visit those sites.

Aside from this daily scanning of sites, it takes about 40 hours of computer time for me to put an issue together. But before it is published there are several members of our own SARC and SEPAR groups, co-editors who also contribute their time to write, edit, and proof-read the content. My thanks to them, and to you, our readers and contributors.

73,

~ John VE7TI, Editor
communicator@ve7sar.net



About this month's cover…

We have been one of a number of stations across Canada commemorating the centennial of our Royal Canadian Air Force. We have made contact with hundreds of stations from VE7RCAF, the special event callsign sponsored by Surrey Amateur Radio Communications from several locations through the Province of British Columbia, and used by many station operators. Thank you for your participation.

"It is not the class of licence the Amateur holds but the class of the Amateur that holds the licence." - *Daren 2E0LXY*

On the Web

ve7sar.net

Between Communicators, watch your e-mail for news, announcements of Amateur Radio events, monthly meetings and training opportunities.

Click the links below to follow our presence on the web and social media:

SARC Blog
ve7sar.blogspot.ca

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or

tinyurl.com/SARCphoto

The Rest Of The Story…

Julius Edgar Lilienfeld

Early semi-conductor developer

Julius Edgar Lilienfeld

Julius Edgar Lilienfeld (April 18, 1882 – August 28, 1963) was an Austro-Hungarian-American physicist and electrical engineer. His contributions to the field of electronics were groundbreaking, even though his name isn't as widely recognized as some of his contemporaries.

Early Life and Education

Lilienfeld was born into a Jewish family in Lemberg (now Lviv, Ukraine), which was part of the Austro-Hungarian Empire at the time. His father, Sigmund Lilienfeld, was a lawyer, and his mother was Sarah Jampoler Lilienfeld. Julius Lilienfeld's academic journey took him to the Friedrich-Wilhelms-Universität (later renamed Humboldt University) in Berlin, where he earned his Ph.D. in physics in 1905. His doctoral research focused on electrical discharges in a vacuum, particularly between metal electrodes.

Career

Lilienfeld's early career, at the University of Leipzig, saw him conduct important early work on electrical discharges in "vacuum", between metal electrodes, from about 1910 onwards. His early passion was to clarify how this phenomenon changed as vacuum preparation techniques improved. More than any other scientist, he was responsible for the identification of field electron emission as a separate physical effect. (He called it "auto-electronic emission", and was interested in it as a possible electron source for miniaturised X-ray tubes, in medical applications.) Lilienfeld was responsible for the first reliable account in English of the experimental phenomenology

of field electron emission, in 1922. The effect was explained by Fowler and Nordheim in 1928.

Early Work and Field Electron Emission

Lilienfeld's early career centered around understanding electrical discharges in a vacuum. His passion led him to investigate how this phenomenon changed as vacuum preparation techniques improved. He played a crucial role in identifying field electron emission as a distinct physical effect. He referred to it as "auto-electronic emission" and explored its potential as an electron source for miniaturized X-ray tubes in medical applications. His work laid the groundwork for further research in this area.

Lilienfeld moved to the United States in 1921 to pursue his patent claims, resigning his professorship at Leipzig to stay permanently in 1926. In 1928, he began working at Amrad in Malden, Massachusetts, later called Ergon Research Laboratories owned by Magnavox, which closed in 1935.

The First Field-Effect Transistor (FET)

In 1925, Lilienfeld filed a patent titled "Method and Apparatus for Controlling Electric Currents," proposing a three-electrode structure using copper-sulfide semiconductor material. This concept would later be recognized as the field-effect transistor (FET). Unfortunately, Lilienfeld faced challenges in building a practical semiconducting device based on his idea. High-purity semiconductor materials were not readily available to him, and he struggled to publish scholarly articles on his work. Consequently, his FET patent did not gain widespread recognition, leading to confusion for later inventors.

Later Years and Contributions

Lilienfeld moved to the United States in 1921 to pursue his patent claims. He resigned from his professorship at the University of Leipzig and settled permanently in the U.S. In 1928, he began working at Amrad in Malden, Massachusetts, which later became Ergon Research Laboratories (owned by Magnavox).

In the United States, Lilienfeld conducted research on anodic aluminum oxide films and patented the electrolytic capacitor in 1931. His method for creating electrolytic capacitors continued to be used throughout the century.

His invention of the "FET -like" transistor, filled several patents describing the construction and operation of transistors, as well as many features of modern transistors. (US patent #1,745,175 for a FET-like transistor was granted January 28, 1930.) When Brattain, Bardeen, and their colleague chemist Robert Gibney tried to get patents on their earliest devices, most of their claims were rejected due to the Lilienfeld patents.

The optical radiation emitted when electrons strike a metal surface is named "Lilienfeld radiation" after he first discovered it close to X-ray tube anodes. Its origin is attributed to the excitation of plasmons in the metal surface.

The Birth of the First Transistor

While engineer Lilienfeld made the initial foray into the transistor field, achieving some progress, due to limitations in the purification process, essential materials for transistor manufacturing couldn't be extracted, making it a theoretical breakthrough. But the real breakthrough came in 1947, when the Bell Labs team of William Shockley, John Bardeen, and Walter Brattain invented the first transistor. Using germanium as the semiconductor material and employing a point-contact structure,

this early transistor fell short in size, integration, power consumption, and performance compared to modern silicon transistors. Nevertheless, it had a tremendous impact at the time, indirectly opening the doors to integration and offering scientists a glimpse into future possibilities.

The Inventors of the First Transistor

William Shockley: Often referred to as the father of the transistor, Shockley was born in London, UK, in 1910. He immigrated to the United States at the age of three and later earned a Ph.D. in solid-state physics from the Massachusetts Institute of Technology. Shockley joined Bell Labs during World War II, where he contributed to war-related research projects. His collaboration with Bardeen and Brattain led to the invention of the point-contact transistor.

John Bardeen: Bardeen, born in 1908, was an American physicist and electrical engineer. He made significant contributions to the theory of superconductivity and later became a key figure in the development of the transistor. Bardeen's work on semiconductors and quantum mechanics laid the groundwork for the transistor's success.

Walter Brattain: Brattain, born in 1902, was an experimental physicist. His expertise in solid-state physics and semiconductor materials was crucial in the creation of the first transistor. Brattain's collaboration with Shockley and Bardeen resulted in the breakthrough that changed the course of electronics forever.

Impact and Legacy

The invention of the transistor laid the foundation for modern electronics. Without it, there would be no integrated circuits (chips), and we wouldn't be in the electronic age we are now. Transistors serve as the fundamental components of digital circuits, controlling the flow of electrical signals to achieve switching between 0 and 1—essential for constructing logical functions in devices.

From point-contact transistors to field-effect transistors, from germanium to silicon, the development journey of transistors has been filled with twists and innovations. Today, transistors continue to evolve, shaping our digital landscape and enabling the technologies we rely on daily.

In summary, the trio of Shockley, Bardeen, and Brattain not only received the Nobel Prize in Physics for their invention but also left an indelible mark on the world of science and technology.

John Bardeen, William Shockley, and Walter Brattain at Bell Labs in 1948; Bardeen and Brattain invented the point-contact transistor in 1947 and Shockley invented the bipolar junction transistor in 1948.

Their legacy lives on in every electronic device we use, reminding us of the power of human curiosity and collaboration in advancing our understanding of the universe.

The first FET device to be successfully built was the junction field-effect transistor (JFET). A JFET was first patented by Heinrich Welker in 1945. The static induction transistor (SIT), a type of JFET with a short channel, was invented by Japanese engineers Jun-ichi Nishizawa and Y. Watanabe in 1950. Following Shockley's theoretical treatment on the JFET in 1952, a working practical JFET was built by George C. Dacey and Ian M. Ross in 1953. However, the JFET still had issues affecting junction transistors in general. Junction transistors were relatively bulky devices that were difficult to manufacture on a mass-production basis, which limited them to a number of specialised applications. The insulated-gate field-effect transistor (IGFET) was theorized as a potential alternative to junction transistors, but researchers were unable to build working IGFETs, largely due to the troublesome surface state barrier that prevented the external electric field from penetrating into the material. By the mid-1950s, researchers had largely given up on the FET concept, and instead focused on bipolar junction transistor (BJT) technology.

Legacy

Although Lilienfeld's FET patent didn't achieve immediate fame, his pioneering work laid the groundwork for future developments in solid-state electronics. The field-effect transistor, which he envisioned decades before Bell Labs' breakthrough, eventually became a cornerstone of modern technology. Lilienfeld's legacy lives on, reminding us of the power of curiosity and innovation in shaping our world.

And that's his story.

~

Special Event Station VE7RCAF

The Royal Canadian Air Force Centenary

by JOHN SCHOUTEN VE7TI

April 2024 marked 100 years of service for the Royal Canadian Air Force as a distinct military element. The Centennial milestone places the RCAF in a unique position to honour its distinct heritage; recognize its tremendous people today; and generate excitement for its bright future. All year, Canada's Air Force will be showcased in a past, present and future context, with a focus on highlighting contributions to national safety and security, international peace and global stability.

The RCAF 2024 Team are curating a year-long program that includes International, National and Regional events, such as the RCAF Run, RCAF Gala, Legends of the Sky, and allied air demonstration team participation in Air Shows across Canada, as well as activities to Inspire future generations of Canadians through STEM initiatives.

Amateur Radio operators across Canada and well beyond participated in this month-long event and made contacts around the world on all amateur radio bands and modes with the special event RCAF callsigns that were granted to provincial amateur radio groups to commemorate the event. In BC, Surrey Amateur Radio Communications is the sponsor for VE7RCAF. This callsign was available during the entire month of April for use by all British Columbia ISED certified operators. Over 1200 contacts were made, and QSL cards and awards will be available to commemorate contacts. Special recognition will be provided to those who contact all the RCAF special event stations across Canada. Further information is available on the VE7RCAF QRZ page.

For information on the RCAF 2024 Centennial itself, check out https://rcaf2024arc.ca/

~ John VE7TI

Special thanks to:

Fred Orsetti VE7IO

John Brodie VA7XB

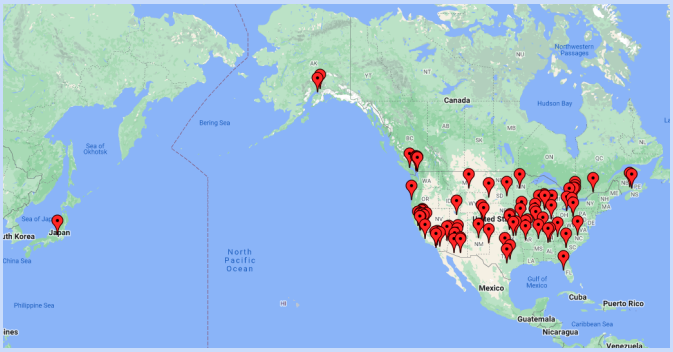
and the many who reserved VE7RCAF during April, to make contacts celebrating this special event.

VE7RCAF POTA Activations

Dmitry VA7DVO activated a POTA station on April 6th and made 84 contacts, including one DX (Japan), all on 60W SSB.

I made a short video of the event. The most heartwarming moment was at the 4:30 minute mark, when I got a "Thank You" from retired USAF.

https://youtu.be/3s0rMw6ZhG8



Donald Anthony
6000 Thorn Grove Pike
Knoxville TN USA 37914

Fred

Enclosed please find 2.00 as requested for the QSL. I went from RCAC to RCAF to Canadian Armed Forces (A). I was one of the first to receive the new green uniform, I hated it. I got my first Ham Ticket in Vancouver where I am from , I was VE7BBK. My wife and I travelled the world so I never got a chance to renew it. My Grandparents got a cabin White Rock every summer, I would stay with them when I was younger, My Dad flew with the RCAF in WW2 on various AC. Including the Lanacaster. He did 62 ops over Europe, Africa, The Middle east, and the Mediterranean. So it runs in the family. I came across your contest by accident but enjoyed it. Again TY for taking the time to answer my request,

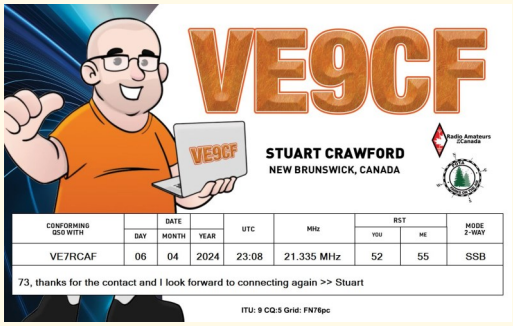
73's
Donald Anthony
ex VE7BBK

Hello VE7RCAF Team,

I love what SARC is doing for the Royal Canadian Air Force's Centennial.

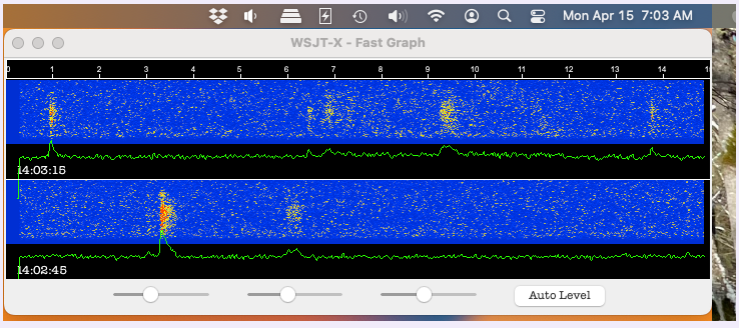
I had the opportunity to make contact with VE7RCAF special events on April 4th at 03:45 UTC via satellite SO-50. I would love to receive a QSL card. 73

Sean B. KK7OVF grid CN85



...and meteor scatter!

Meteor scatter on VE7RCAF. Screenshots taken during Kevin VE7ZD's operation. The bright sections of the trace are meteor pings, i.e. signals being reflected off of ionized meteor trails.



Some of the experiences using VE7RCAF

Orca DXCC Members Participate in VE7RCAF Centennial Radio Operation

VA7MM's WW2 Army aircraft Command Set transmitter model BC-459-A covers 7.0–9.1 MHz. The toroidal transformer and variable capacitor enable impedance matching and RF output of 50 watts.

In commemoration of the Royal Canadian Air Force (RCAF) Centennial, Orca DXCC club members Mark Mattila, VA7MM, and Toby Haynes, VE7CNF, were on the air with special event RCAF callsign VE7RCAF operating WW2 vintage aircraft Command Set 50W transmitters. The first of three planned sessions was completed on Easter Monday with eighteen 40m CW contacts from across the Pacific Northwest and Hawaii. The next operations were on Vimy Ridge Day and World Amateur Radio Day with the sound of a WW2 vintage set, tuned in at the indicated times and frequencies:

Day	2024 PDT Date	Time Slot	Frequency
Easter Monday	Mon., April 1	19:00 to 23:00 PDT (02:00 - 06:00 UTC)	40m CW 7050 kHz +/-
Vimy Ridge Day	Tue., April 9	19:00 to 23:00 PDT (02:00 - 06:00 UTC)	40m CW 7050 kHz +/-
World Amateur Radio Day	Wed., April 17	19:00 to 23:00 PDT (02:00 - 06:00 UTC)	40m CW 7050 kHz +/-

For more information on the WW2 vintage sets: contact Mark VA7MM va7mm@telus.net or Toby VE7CNF ve7cnf@telus.net.

[Left] An array of power supplies provide four DC voltages required to run the transmitter at VA7MM: 28V (filaments), 200V (oscillator), 275V (screens) and 600V (final plate).

[Right] VE7RCAF operating 40m CW from VA7MM with BC-459-A Command Set transmitter.

[Left] VE7CNF's transmitter model BC-458-A has been modified to shift frequency coverage up into the 40m band.

[Right] VE7RCAF 40m CW operation from VE7CNF with vintage transmitter and modern receiver in the right background and homebrew T/R relay unit in the left foreground.

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News You Can't Lose

The Annual SARC Fox Hunt

May 11—Crescent Park, Surrey

by JOHN SCHOUTEN VE7TI

Amateur radio direction finding (ARDF), also known as radio orienteering or radio fox hunting, is a fascinating sport that combines radio technology with map and compass skills.

Origins of Direction Finding

Direction finding has been around almost as long as radio itself. In 1888, Heinrich Hertz observed that signals were strongest when a loop antenna was oriented in a specific direction. By 1900, experimenters noticed similar behavior with dipoles. Antennas were soon designed to rotate, either to maximize signal strength or locate the transmitter.

However, a fundamental challenge remained: how to determine which side of the antenna was pointing toward the signal. Despite this limitation, early systems like John Stone's patented design in 1901 and Lee De Forest's novel system in 1904 paved the way for further developments.

Bellini-Tosi System

In 1910, Italian engineers Ettore Bellini and Alessandro Tosi introduced an innovative solution. Their Bellini-Tosi system used two antennas at right angles, feeding coils. A third loop moved inside the coils to pinpoint the direction. This breakthrough allowed large antennas to remain stationary, making radio finding practical on a wider scale. The Bellini-Tosi system was commonly used for aerial navigation from the 1920s until the 1950s.

Amateur Radio Direction Finding Today

ARDF enthusiasts participate in races where they use specialized receivers to locate hidden transmitters. Competitors rely on their skills to navigate through forests, parks, or urban areas. The sport fosters camaraderie, technical expertise, and a love for both radio and the outdoors.

Amateur radio direction finding has a rich history and continues to captivate enthusiasts worldwide. Whether you're exploring the past or participating in a modern ARDF event, the thrill of tracking radio signals remains timeless.

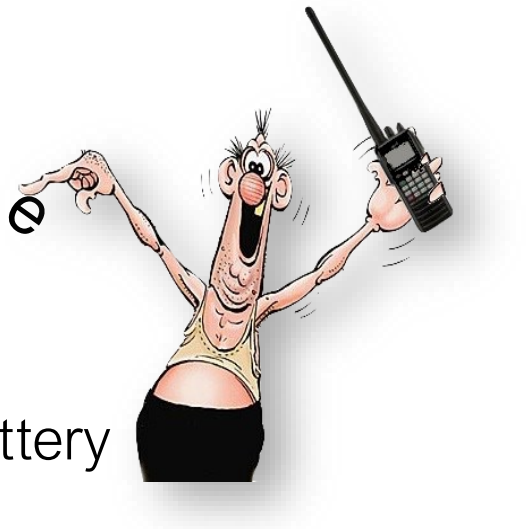
The SARC Annual Fox Hunt

I couldn't find a reference in our club records how long SARC has held its annual fox hunt. Years ago it was called a bunny hunt, with a crystal bunny awarded to the current year's winner. We hold the event on the Saturday before Mothers' Day and follow it with a barbecue. In earlier years we used 2m foxes exclusively but more recently that has been replaced by 80m foxes which are easier to locate.

~ John VE7TI

- Where's That Radio? A Brief History Of Direction Finding
- Radio Direction Finder - Engineering and Technology History Wiki
- Amateur radio direction finding - Wikipedia

Page 13—News You Can Los



The Lighter Side of Amateur Radio

How to Turn Your Cactus into a Battery

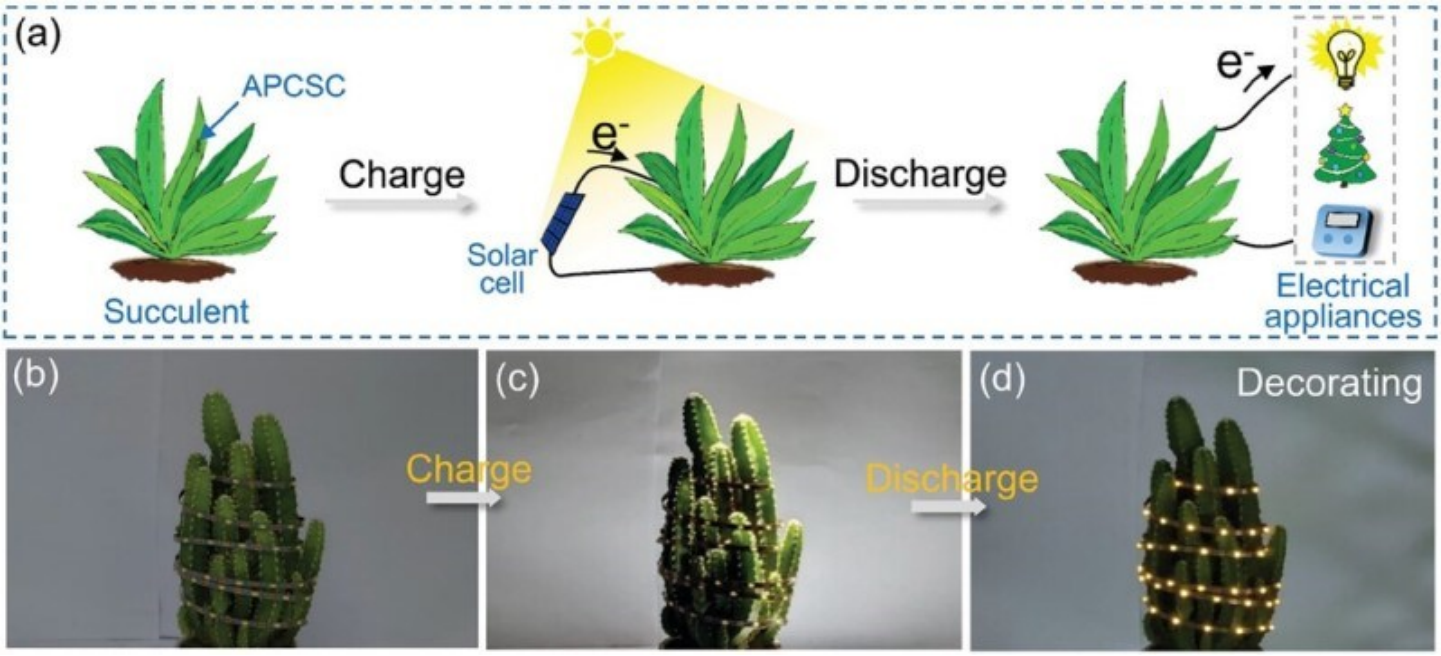
Biomass-based energy storage devices

Have you ever wondered what to do with your old, dusty cactus that sits on your windowsill? Sure, it's a nice decoration, but does it really serve any purpose? Well, what if I told you that you could turn your cactus into a battery that can power your phone, laptop, or even your car? Sounds crazy, right? But it's not a joke. It's actually a scientific breakthrough that could revolutionize the field of energy storage.

Researchers from Beijing have discovered a way to turn succulents, such as cacti and aloe vera, into supercapacitors, which are devices that can store large amounts of energy and release it quickly. Unlike conventional batteries, which rely on chemical reactions, supercapacitors use electric fields to store and release energy. This makes them faster, safer, and more durable than batteries.

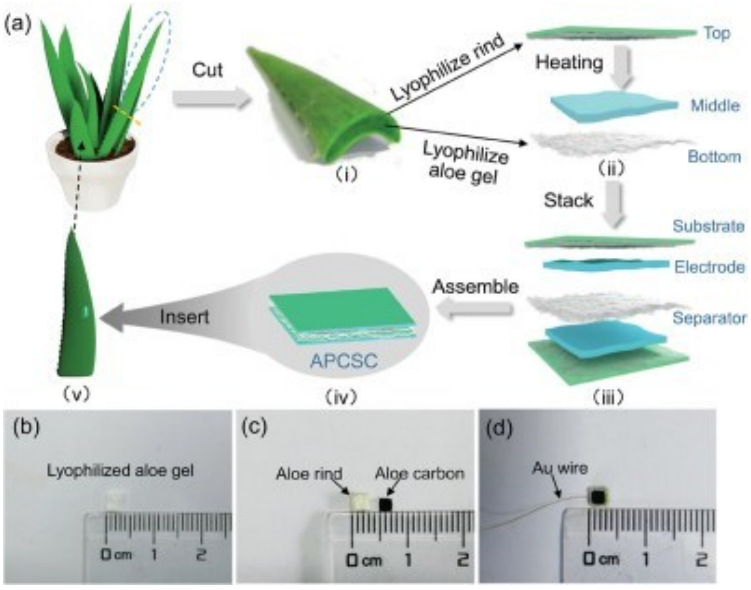
But how do you turn a plant into a supercapacitor? Well, it's surprisingly simple., refer to the diagram on the next page. All you need is a gold wire, a pair of scissors, and a plant. Here are the steps:

1. Cut a small slit in the stem of your plant and insert the gold wire into it. This will act as one of the electrodes of the supercapacitor.
2. Cut another slit in a different part of the stem and insert another gold wire into it. This will act as the other electrode of the supercapacitor.
3. Connect the two wires to a circuit that can measure the voltage and current of the supercapacitor. You can use a multimeter, an oscilloscope, or any other device that can do this.
4. Voila! You have just created a supercapacitor from a plant. The plant's tissue fluid acts as the electrolyte, which is the medium that allows the electric charge to flow between the electrodes. The



plant's cell walls act as the separator, which prevents the electrodes from touching and short-circuiting.

The researchers found that their plant-based supercapacitors had a capacitance of 182.5 millifarads per square centimeter, which is higher than most of the biomass-based supercapacitors reported previously. They also found that their supercapacitors did not harm the growth of the plants, and could be built in most of the succulents, such as cactus, aloe vera, jade plant, and more.



The researchers believe that their invention could have many applications, especially in remote areas where electricity is scarce or unreliable. For example, they suggest that people in deserts could use cacti as supercapacitors to power their devices, or that farmers could use their crops as supercapacitors to store solar energy. They also envision that their supercapacitors could be integrated into smart botany, forestry, and agriculture, where plants could communicate with each other and with humans through electrical signals.

So, the next time you see a cactus, don't think of it as a useless prickly plant. Think of it as a potential power source that could change the world. And if you're feeling adventurous, why not try to make your own supercapacitor from a plant? Just be careful not to prick yourself with the gold wire or the cactus spines. And don't forget to water your plant, because it still needs to live.

https://www.theaic.org/pub_thechemist_journals/Vol-92-No-1/Vol-92-No1-article-8.pdf

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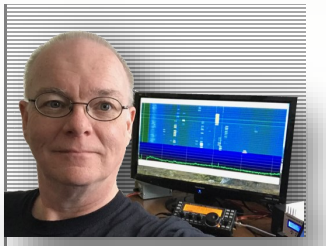
Radio Ramblings

Test Equipment and an Easy CW Decoder Project

by KEVIN McQUIGGIN VE7ZD / KN7Q



Kevin VE7ZD/KN7Q is active in EME, meteor scatter and much more. He lives on Vancouver Island

I am fortunate to have acquired a fairly good selection of laboratory-grade test equipment here in the shack. This equipment has proven invaluable to me when working on hardware and software projects.

Good test gear doesn't have to be expensive and can be of use to you no matter what kinds of projects you work on. This issue I'll give you a rundown of the various types of laboratory test equipment I have here at VE7ZD, what each device can do, where you can find good surplus equipment, and how you can use it in your projects.

I'll also introduce a project describing how you can write your own CW decoder in software using a low-cost Arduino microcontroller. There's a simple method for decoding CW that is not often discussed, and you will see how easy it is to implement. You won't need to have any programming experience to get this project up and running, and the code will be available for free on the popular GitHub software repository.

Let's get started!

Test Equipment

Most of us have basic test equipment such as a multimeter, dummy load, SWR meter or an extra power supply in the shack. Test equipment can help you in many ways. If you design or build equipment, then it can help you design and test your creations, and it can be of great utility in debugging problems or making modifications or repairs to your other gear as well. In routine situations, test gear can help you easily determine if your radio equipment and accessories are hooked up properly and functioning normally.

If you own this basic gear, then you probably know how to use it [1].

In this article I'd like to talk about test gear that is normally found in commercial or university electronic design and repair labs. Laboratory-grade test equipment is usually performance-calibrated and possesses much higher accuracy and tighter tolerance than test gear targeting the amateur radio community. Lab-grade test equipment usually has many more features as well.

Use of test equipment like lab quality oscilloscopes, signal generators and spectrum analyzers can open a whole new world of design, test, and repair possibilities for you. If you had access to it, then you'd love using it, and would learn a lot from it.

This class of test gear is not commonly found in ham shacks. Therefore, a lot of hams do not really understand what some of these advanced devices, such as spectrum analyzers and noise figure meters, can do, or how the gear can be used to greatly simplify testing and troubleshooting of radio equipment.

"Armchair wisdom" in the ham community gives the impression that 1) lab quality test gear is very difficult to use; and 2) that it is *very* expensive.

Both assumptions are false. Use of lab quality gear is fully explained in the user's manual. If you purchase a piece of older lab-grade test equipment without the manual, then there are several web sites that will provide free PDFs of user and service manuals for hundreds of different brands and models of test gear [2]. If you like, you can usually also purchase hardcopies of these manuals on eBay.

The user's manual explains what the test gear does, what kinds of tests or measurements it can make, and how to use the device. Every user's manual for lab-grade test equipment also includes many examples of typical use situations. Like the manual for your rig, if you "RFTM" [3] then you will be able to use the equipment.

As for cost, it is a fact that brand new, state of the art test equipment can be very (very!) expensive. Used equipment, however, is readily available if you know where and how to look for it and may be purchased at a fraction of the cost. I'll look at sources and typical "acquisition scenarios" for older lab-grade test equipment below.

Let's look at a couple of pieces of lab-grade test equipment that are available on the used market and describe how they could be used in your shack.

A Super-Useful Combo: Signal Generator and Spectrum Analyzer

We all know what a signal generator does. It generates a signal at a specific frequency that we can use to tune in to on our receivers to ensure that they are working; and it allows us to calibrate our receivers so that their frequency readout is accurate. Let's dive a bit deeper.

Lab-grade signal generators are calibrated in both:

- Frequency output (very common in amateur-grade test equipment); and
- Output signal level (a feature not usually found in lower-grade equipment).

See Figure 1 for my current in-shack signal generator. It's an HP 8648D.

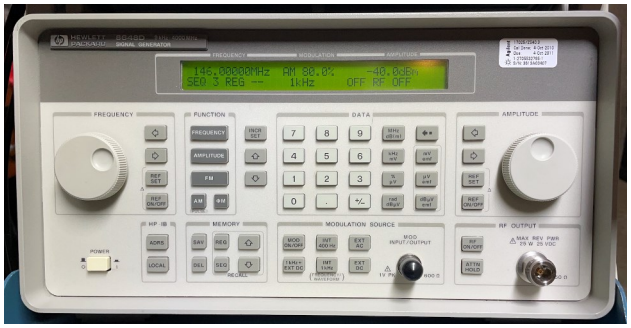


Figure 1 – Signal Generator

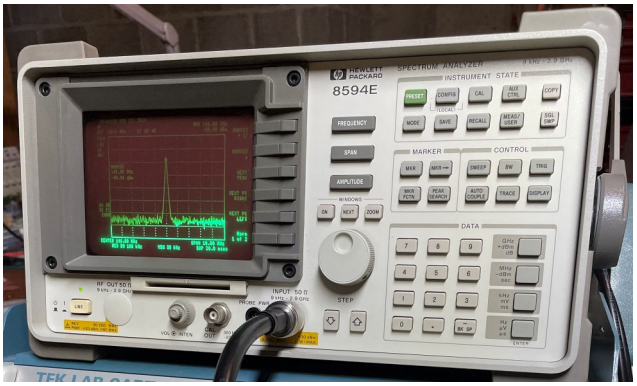


Figure 2 – Spectrum Analyzer

Calibrated lab-grade signal generators typically cover a very wide range of frequencies (for example, 0.9 to 3200 MHz) and are accurate in frequency to a few ppm (parts per million). Signal levels on lab-grade signal generators are always indicated in dBm (signal level relative to a milliwatt, see [4]) and are accurate to a fraction of a dBm. A typical generator such as those available on the surplus or used market will be able to generate calibrated signal levels from about -130 dBm to 20 dBm (about 0.0000000000000001 to 0.1 watts) [5].

Unlike cheap devices marketed to hams, the lab equipment's calibration ensures accuracy in both frequency and signal level, and it is this accuracy that, combined with a spectrum analyzer, can be of immense value to us as hams [6].

Like the signal generator, a calibrated spectrum analyzer (see Figure 2) provides extreme accuracy in resolution of received signals. It is accurate both in terms of the centre frequency being received, and in the signal level of all signals within the received bandwidth. A spectrum analyzer (SA) is an extremely useful piece of test gear that I find nearly indispensable in my shack [7].

For those unfamiliar with what a spectrum analyzer does, it's essentially a high-quality receiver that has configurable (and calibrated) sensitivity and receive bandwidth. Output is displayed graphically. Typical centre frequency (RX frequency) in surplus/used units ranges from a few hundred KHz to 3 or 6 GHz. The user selects a range of frequencies around the centre frequency for display (this is called the bandwidth) from a few hundred Hz to 10 or more MHz. These parameters (centre frequency, bandwidth and other settings) are typically displayed on the output screen of the analyzer. You can see the parameters displayed along with the spectrum analyzer bandwidth in Figure 3.

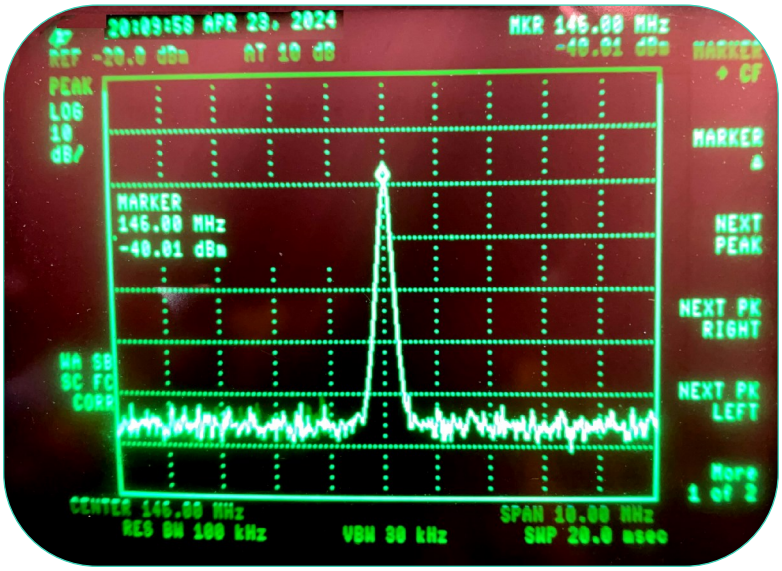


Figure 3 – Closeup of Typical Spectrum Analyzer Display

Devices Used Independently	
Signal Generator	**Spectrum Analyzer**
Calibrate your transceiver's RX frequency to extremely high accuracy	Using an antenna, scan your environment for noise sources or other radio signals
Accurately measure the sensitivity of your receiver	Observe your transmitted signals (**CAUTION: See Caveats below!**) to measure their levels and signal quality
Test attenuators, relays, and dummy loads to determine their actual performance	Look for spurious signals emitted from your equipment
Troubleshoot a receiver	Use as a radio receiver (with demodulator option)
Generate a low power test signal on air for testing of other equipment	Use with an SDR transmitter to refine the quality of generated signals
Use as a very low power transmitter to enter a QRP contest (why not?)	

Table 1 – Signal Generator and Spectrum Analyzer (Individual Usage)

Devices Used Together
Accurately determine losses in your feedlines
Accurately measure gain through preamplifiers and amplifiers (**CAUTION: See Caveats below!**)
Test splitters and couplers to measure their performance and determine port isolation
Determine receiver noise figure
Measure antenna patterns on a homebrew test range
Measure the frequency accuracy of your transmitters
Compare waveforms with those generated by transmitters you have built yourself
Test attenuators, relays, and dummy loads to determine their actual performance

Table 2 – Signal Generator and Spectrum Analyzer in Combination

Usage Examples

Let's look at what this valuable combination of test devices can do in your shack. Either device may be used individually, or you can use both together to perform some useful tests. Take a look at Tables 1 and 2.

These are only a few examples of how this handy pair of devices may be used. Let's look in detail at a single example: finding the loss of a short length of coaxial cable.

Figure 4 shows a coil of RG8X coax that was lying about in my shack. It is 173 inches (14.42 feet) in length. Let's measure the loss of this cable at 146 MHz.

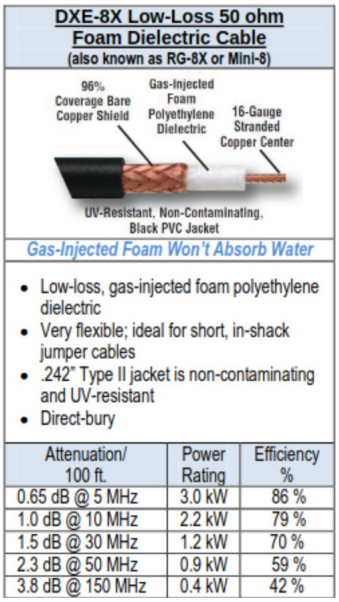
First, what should we expect for the cable's loss figure? The "book value" from the manufacturer's spec sheet at https://dxengineering.com says that RG8X has a loss of 3.8 dB per 100 feet at 150 MHz (see Figure 5). 14.42 feet should give us an expected loss of 14.42/100 x 3.8, or 0.548 dB. Let's keep this figure in mind.

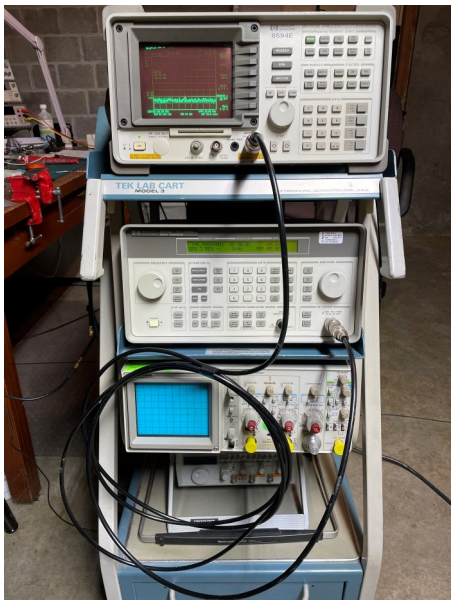
We'll do the test by setting the signal generator to 146 MHz at a known signal level, and then running that signal through the test cable and into the spectrum analyzer. We will read the input signal level from the cable on the spectrum analyzer's screen. This will give us the actual signal loss though the cable. If all works as expected, then we should see a signal level on spectrum analyzer that is about 0.5 dB lower than the signal generator's reading. Remember that both test devices are calibrated, so we can trust these values!

I set the signal generator to 146 MHz, and its output signal level to -40 dBm. This is 10^{-4} or 0.0001 milliwatts, or 0.0000001 watts – easily enough power for an accurate test. Similarly, I set the spectrum analyzer to 146 MHz with a reference level of -20 dBm (10^{-2} milliwatts, or 0.00001 watts). Signals below this level will be visible on the screen. Without any cable loss, the input -40 dBm signal would be displayed 2 gradations (10 dB per division) below the spectrum analyzer's top reference line. You can use the "marker" ("MKR") button on the SA to get the actual numeric value of any point on the trace.

The test setup is shown in Figure 6.

Figure 4 – 173 Inches (14.42 Feet) of RG8X Coaxial Cable





[Left] Figure 5 – RG8X Specifications;

[Right] Figure 6 – Test Setup (146 MHz, -40 dBm)

Once the cable was in place and the SG and SA set, I took a moment to ensure that the signal level going into the spectrum analyzer was not going to damage it. This is a ***critical*** step (details covered in "Caveats" below) to ensure that the extremely sensitive front-end circuitry on the SA will

not be damaged by an excessive signal input. Everything checked out, so I turned the RF output from the SG on and saw the received signal on the SA's display. See Figure 7 for a shot of the display.

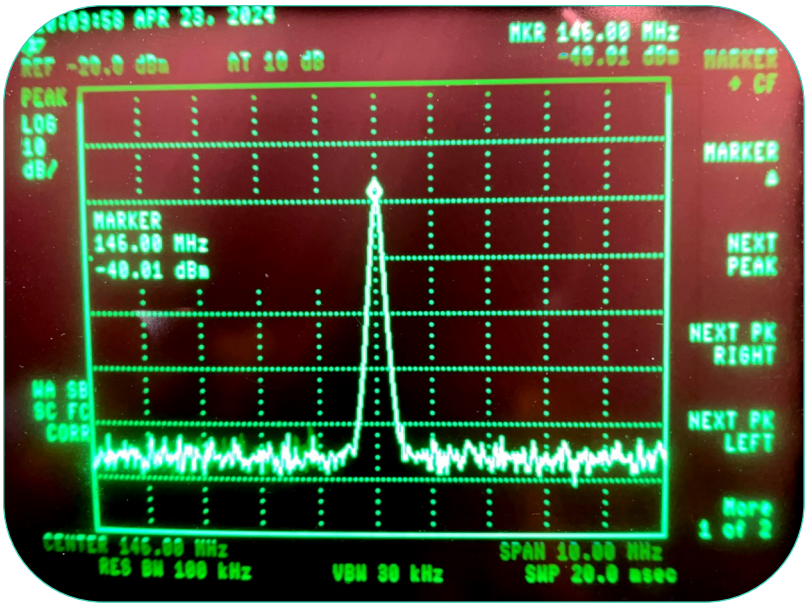


Figure 7 – Test Signal Displayed on SA Display

The top reference line on the display is -20 dBm, and each horizontal line below it represents 10 dBm. You can see the noise floor at about -67 dBm, and the 0.00001-watt test signal as the central peak on the display, where it reads two gradations down from the reference line, or about -40 dBm. We will see the actual test value from our cable below.

As an aside, consider the extremely low power that the SG and SA are dealing with here. Big, powerful signals are not necessary for accurate readings!

The SA display shows centre frequency, bandwidth, and a few other interesting values that you will use once you get more experience with the device.

Let's get back to our cable test. I used the "marker" function to label the signal's peak and took a screenshot of the result (i.e. the exact signal level coming in from the SG at 146 MHz). This is shown in Figure 8.

Figure 8 – Signal Level From Test RG8X Cable

Note the received signal level of -41.20 dBm. How do we interpret this? Well, the SG's output is -40 dBm. This signal traverses the 14.42-foot cable and is received by the SA at a signal level of -41.20 dBm. There is 1.20 dBm loss of signal at 146 MHz.

This is the actual loss that we see through this cable at 146 MHz. You may have already thought: "hey, this is way lower than the predicted loss value of 0.548 dB"!

You are correct! Given the cable's specifications, we are seeing an additional 0.652 (1.20 – 0.548) dB loss. Why? Here are some possible reasons:

1. The cable might have degraded with age;
2. The connectors might not be attached to the coax optimally;
3. There may be loss through the adapters used to connect the PL259 connectors on the cable to the SA/SG's N connectors; or
4. The manufacturer's specifications might have been "idealized" for marketing purposes.

I think that factors 1, 2, and 3 are the likely culprits in this case. The cable is about five years old and was used both in my shack and outdoors through its lifetime. Soldering connectors by hand is usually a source of error. The biggest factor in this test, though, is number 3. I had to use two

PL259-to-N adapters to connect the test cable to the SG and SA because both units have N connectors on their front panels. I don't have many PL259 style adapters. One of them was new (from Amphenol, a quality manufacturer) but the other one was a "no-name" adapter. Unbranded adapters are cheap but of undocumented quality. They are usually lossy. A rule of thumb is to assume about 0.5 dB loss at VHF and higher frequencies for questionable adapters.

So, adding about 0.5 dB loss for the two adapters and accounting for cable age and likely-not optimal attachment of the two PL259s to the RG8X probably accounts for the extra 0.652 dB loss that we saw in the test. The bottom line is that this cable is fine for use at 146 MHz. In practical terms, this was a test for this article to show the capabilities and utility of lab-grade test equipment. You do not have to be concerned with fractional dB losses in amateur practise!

As we all know, cable loss increases with frequency. Not one should ever use RG8X coax, for example, at 1296 MHz. Just for fun, I ran the test again at 1296 MHz. This was easy – I just changed the SG and SA frequencies to 1296 MHz and read the loss value again on the SA's display. At 1296 MHz, loss through the cable increased to 2.97 dB. Just shy of half of the power going into the cable made it out: and that's for only a 14-foot length. Imagine the loss through a 50- or 100-foot run of coax! Don't use RG8X (or worse, RG58) at UHF+ frequencies!

Figure X – RG8X Loss – 14 Feet at 1296 MHz (Yikes!)

Where to Find Lab-Grade Test Gear

I have acquired my lab-grade test gear from a variety of channels over several years. I bought some of it on eBay, and other gear came to me through word of mouth, scrounging good quality electronic surplus stores, and through contacts at university and corporate labs that were upgrading their test equipment.

It's important to be careful buying test gear online, and it is critical that you look at reviews and sellers' histories. There are many reputable sellers, but unfortunately many less reputable ones as well. When considering an eBay purchase I always contact the seller directly, initiate a conversation and have some discussion on the unit I am considering in order to make an informed decision on the equipment and the seller.

Corporate research and development (R&D) labs need to have the latest test equipment because they are doing leading-edge design and development work. Similarly, university labs are often doing "bleeding edge" work, and use of high-quality engineering and electronic test gear is critical to success.

Some schools have specific surplus equipment recycling facilities (for example, the University of British Columbia) that offer used and fully functional test gear for sale at amazingly low prices. Other schools aggregate surplus equipment over a number of months and then dispose of it without ever offering it to the general public. Often it goes directly to a metal recycler and is chopped up.

I would recommend speaking with university staff or finding contacts at engineering school laboratories who can keep you in the loop when a set of test equipment is coming up for disposal. I am fortunate to have been able to find several pieces of fully functional test gear in this way, and been able to rescue it just before it hit the dumpster at no cost.

SARC members may recall that I was able to "scoop" an entire set of university lab test gear in this manner and acquire it from lab staff at no cost a couple of years ago. It was donated to SARC for club use. This gear may be older, but it is functional and reasonably up to date. It can easily be used as a fantastic learning and experimentation platform for any of us involved in amateur radio.

Corporate R&D labs are also a good source of equipment, but you need to have contacts in industry, or another means of keeping up with what the labs are doing. It is also not uncommon for start-up technology companies to fail and need to dispose of their assets. If you can be in the right place at the right time then you can acquire this gear, often with the most modern capabilities, at very low prices.

Most of us don't live in Silicon Valley, though, so the next best thing is to get known at quality electronic surplus stores. The owners of these stores are well-connected with industry and often purchase surplus test equipment for resale to the public at good prices. There is an excellent store in this category in Portland, Oregon, one in central BC, and several in southern California. All of these stores have an online presence, so bookmark their websites and check back often.

Cost

No article on this topic would be complete without discussing cost. "Free" is great if you have contacts and can find gear in this category, but practically you will likely be purchasing this lab-grade gear from reputable sellers. If you have contacts in industry or in academia, then patience is a virtue.

Purchase price for a high-quality used signal generators in working condition, with reasonable frequency coverage and recent factory calibration will probably be in the range of $1K to $1.5K. Similar quality spectrum analyzers will be about $1.5K to $2K. Obviously, this is a significant cost, but this option is always there if you don't have any academic or corporate contacts. Keep in mind that these units were probably $10K or more to purchase brand new.

I like Hewlett-Packard (HP) test equipment [8]: it is of excellent quality and is reliable long after its factory calibration expires. Most HP gear incorporates internal self-test and self-calibration routines that make the gear eminently suitable for amateur radio use.

Caveat

Now some very important information.

A spectrum analyzer is a sensitive piece of equipment. It is critical that you do not exceed the rated input signal level on your SA. This level will be printed on a prominent warning label on the front of the device. My HP 8594E's input limit is 30 dBm or 1 watt. Input signals greater than this limit will overload and destroy the front-end (sensitive input circuitry) of your analyzer and render it essentially a "boat anchor". Repair of the front-end on a used spectrum analyzer is never cost effective and is not the kind of thing that you can do yourself. You may be able to get the front-end working again, but the SA will lose its calibration and the readouts will be useless.

Don't overload your SA! Check and double check the level of the signal that will be presented at the SA's input terminal. **Above all, NEVER connect the output of your amateur transceiver (even with its power turned "way down") into a spectrum analyzer's input.**

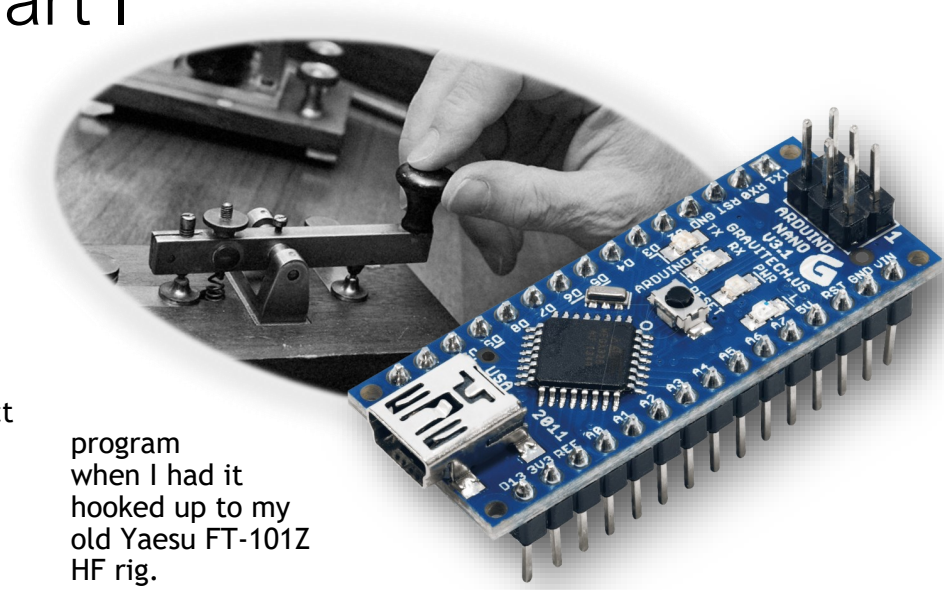
Future segments on test equipment will look at other helpful devices in the shack, including lab -grade:

- Oscilloscopes;
- Frequency counters;
- GPS disciplined oscillators;
- Network analyzers; and
- Noise figure meters.

Now on to the second topic for this issue.

Decoding CW – Part I

by KEVIN McQUIGGIN VE7ZD / KN7Q



I note from the recent SARC Weekly Updates that the club is starting a project for members that will give them the opportunity to assemble their own CW (Morse code) decoder system. A PCB and other parts and all the necessary software are included. This is a fantastic project! If you know CW then automatic decoders are still very helpful on the air, but if you don't know CW and aspire to obtain a CW qualification so that you can get on HF, an automatic decoder can be of great help to you as you learn the new language of Morse code.

This article is not connected to the new project but will augment it to give participants an idea of how one type of CW decoder works. Even if you are not involved in the project, I hope that the discussion below will give you some insight into how CW can be decoded, how algorithms are designed, and how computer programs are built to implement these algorithms to solve problems such as this.

A Bit of History

There's a way that CW can be decoded in software that is far less complex than most of the implementations of software decoders that I have seen in the field over the past couple of decades. I first used this method in the late 1970s on the clunky microcomputers of the day. The method worked well, and as a teenager I recall impressing my parents with the decoding program when I had it hooked up to my old Yaesu FT-101Z HF rig.

Many recently developed software CW decoders are much more complex than this older method, with computer code that is easily ten times longer than the code that I wrote circa 1979. Code complexity is an often-debated topic in computing science. A key question is whether the increased complexity of the "better" code results in a corresponding improvement in the code's performance.

A programmer needs to consider the ROI (return on investment) for a project: bigger programs are harder to write and maintain, contain more potential bugs, consume more power, and use more CPU cycles, systems resources and memory. The increased demands on the underlying CPU and hardware roughly translate to increased cost. Any performance improvement should be worth this investment. Is a more complex program worth the effort it takes to write and maintain it?

I must admit that the performance of these newer decoding programs is better than my old method, but not by orders of magnitude [9]. The performance increase of the modern decoders does not really correlate with the increased complexity of the decoder software. Based on my experience,

I think that my 1970s approach generates about 80 percent of the performance of the newest CW decoder systems, but at only about 25 percent of the complexity.

It is this older decoder method that I will describe in this article.

My initial implementation of the decoder was in "assembly language": a low-level language that is very close to the CPU and system hardware. "Assembler" code performs very well but is harder to write, debug, and maintain. I used assembler because it was all that was available at the time. The simplicity of the decoder method (or "algorithm") made the code easy to write.

In the mid-1980s I rewrote my original assembler code in the high-level language called "Pascal" so that it would run on my "PC Junior". The algorithm remained the same, of course; I just expressed it in a higher-level language.

Last week I found the Pascal version of the code and decided to rewrite it as a "Sketch" for use with the Arduino series of popular microcontrollers. Although I have CW decoders built into my two HF rigs, I thought that it would be fun to resurrect my old program and see (once again) how it performs in comparison.

Sketch uses a syntax very similar to C, a mainstream programming language that is used in all areas of modern computing. It only took a day to rewrite my old Pascal code in C because they are very similar in structure and syntax, like most modern high-level programming languages are. It's the Sketch code that we will be discussing in this article [10].

But first (for ANY programming project) you need to devise a method (algorithm) for solution of the problem at hand. Once you have the algorithm then you can implement it (i.e. write programming code) to implement it in any programming language you'd like!

The Decoding Algorithm – Fundamentals

The simplicity of this CW decoding algorithm is surprising. Bear with me as we go through some foundational steps.

A) Foundational Elements of CW:

Morse code contains three foundational elements:

- The ***dit***;
- The ***dah***; and
- The ***quiet period*** (or spacing) between CW symbols.

Any decoder needs to be able to distinguish between dits and dahs, and also be able to tell when a symbol (letter, number, punctuation, prosign, et cetera) is complete.

Fortunately, there is a "standard ratio" of dits, dahs and timing that allows a human operator to tell them apart. This ratio is expressed as **1:3:3** and it was established in the late 19th and early 20th centuries. You have undoubtedly discussed this ratio in your CW course, or it has been addressed in your CW smartphone app.

Let's look at the ratio:

- A ***dit*** is the base element and is given a time value of **one**;
- A ***dah*** is **three** times longer than a dit; and
- The ***quiet period*** (space) after a full symbol has been sent is **three** times longer than as a dit, as well.

Spacing between words in CW is generally set as a time period equal to five dits, but we will ignore this for the time being. More on this later.

Key to this **1:3:3** standard ratio is that it applies ***no matter what the speed of the Morse code being transmitted or received is***. Whether CW is being received at 5 words per minute (WPM) or 30 WPM, this ratio remains constant.

This ratio consistency is key to how the decoding algorithm works!

B) Telling a Dit from a Dah:

How can we tell a computer to discriminate between dits and dahs?

Let's do a bit of a thought experiment. Imagine that you are listening to someone send CW using a code practise oscillator. From your training, you know the standard ratio (1:3:3) and can tell a dit from a dah by the relative length of the code elements which are being sent. You also know that you can use silence between code symbols to indicate the end of each letter or number; that is when your brain decodes the symbol and you write it down.

Humans have an internal sense of time and are therefore able to tell a dit from a dah. Our brains can do this even at very high CW speeds. While very few of us are able to decode CW at 35 or 40 WPM, any of us can discern a dit from a dah, even at those high speeds.

Computers do not have an inherent sense of timing like our brains do - at least not yet. How do we time dits and dahs in an algorithm (and in subsequent computer code) so the computer can tell them apart?

Our challenge is to get the computer to discern between dits, dahs and quiet periods and do this decoding electronically. Here's a solution: if we can tell the computer to time the length of every code element (dit, dah, and spacing) then it will be able to use these times to decode each Morse code symbol.

Your first task, then, is to write code that will time each code element. Assume that in our program we are listening to the person sending CW on the code practise oscillator and that the computer is able to tell when the key goes down, and when it is released. Assume also that we can compute a time for each of these key-down periods, and that we can also time the length of quiet periods after a CW symbol is complete.

There's a way to do this on the Arduino using one of the device's I/O (input/output) pins, and we will discuss the details of this in the next issue of *The Communicator*.

Once we are tracking key-down and key-up times, we just about have all we need to decode the incoming CW.

C) The Key Idea: [pardon the pun…]

Here is the key idea of this decoding algorithm:

- You can tell whether a particular code element is a dit or a dah by comparing it to the **average length** of all the code elements received in the recent past.

A code element is a dit or a dah. Okay, let's dig into this a bit.

What the key idea says is that, irrespective of the speed of the incoming CW (5 WPM or 50 WPM), you can discern a dit from a dah by comparing the element's key-down time to the average key-down time (for all received code elements) over the recent past:

- If the current code element's key-down time is *less than or equal to* the average, then it is a dit.
- If the current code element's key-down time is *greater than* the average, then it is a dah.

This is a very cool result! As long as you know the average length of dits and dahs over the recent past (we will better define this loose term in the next section), then you can discern a dit from a dah by comparing its key-down time to this average value. Dits are shorter than the average, and dahs are longer.

Once you have the average key-down time, then you can detect the end of a symbol by measuring the silence after the last code element. Once that silence is great than the average, then you know that the end of the symbol has been received and you can look up the symbol in a table to see what character it represents.

In this way, by maintaining a "running average" of the length of received code elements, you can easily discern dits from dahs, and detect the end of Morse code symbols. Critical to this is the process of timing key-up and key-down times in the received signal.

Implementation of the Algorithm

So, we have an idea of how to detect and classify CW code elements. It's time to think more specifically about how we can implement this algorithm on an Arduino. We need:

- An input channel that will be carry the key-up and key-down signal from the sending CW source
- A timing routine that will measure the key-down period when the input signal is present
- Another similar timing routine which will measure the key-up time (when no input signal is present)
- A process to record key-up and key-down times for the recent past
- A routine that will average all the previous key-up and -down times

A smart philosophy in developing computer programs is to not try to do everything (i.e. add every feature) at once. This is called (or used to be, in the computing stone age) "stepwise development".

For simplicity, we will assume that for the first version of our program that the CW input will be from a switch or straight key attached to an input pin of the Arduino microcontroller. This will provide a simple on/off signal (0 or 1 binary value) on the pin that we can read in our program very simply.

Once this code is working properly and we are correctly decoding this direct input we can add a bit of circuitry to interface the Arduino input pin to accept audio input from an HF radio. The CW audio signal will then work through our simple circuitry to generate the 0 or 1 input signal.

To Be Continued

Next issue we'll address each of these implementation requirements and get into the nuts and bolts of how dits, dahs, and spaces are going to be timed, and how we can maintain the running average of the key down times for dits and dahs. We will write the core functions for the Arduino Sketch, and I'll provide the sample code.

Conclusion

That's it for this issue. I hope that you can see the utility and benefit of using a lab-grade spectrum analyzer and a signal generator and the interesting things that they can do both in isolation and in tandem.

If you want to learn a bit more about programming and CW decoding in software, then we will get deeper into that with some working code next issue. Complex tasks can be accomplished using surprisingly simple algorithms.

Have a great spring season and remember that feedback on Radio Ramblings is always welcome and can be directed to the Editor, or directly to me at mcquiggi@sfu.ca. Thanks for reading!

73,

~ Kevin VE7ZD / KN7Q

See the references to this article on the next page and an article on a CW decoder project on page 31...

References:

[1] Use of DVMs, dummy loads and SWR meters is part of the skill set of every ham, and these pieces of test gear are also described in introductory amateur radio courses.

[2] If you bought your test gear as surplus, online, or at (for example) an amateur radio swap meet and lack manuals for it, then there are several excellent sites online that have PDFs of users' manuals – and often service manuals and schematics for this test gear as well. A good place to start is https://archive.org.

[3] "Read The (Friggin') Manual". Irreverent vernacular from the early days of open-source software and the Internet. See https://en.wikipedia.org/wiki/RTFM.

[4] "dBm" is a logarithmic scale that expresses power changes as ratios compared to one milliwatt. 3 dBm represents a doubling of power, while -3 dBm represents a reduction of power by one half. dBm is used in electronics because it allows circuit gains (and losses) to be calculated by simple addition rather than repeated multiplication or division. For example, a 3 dB gain followed by a 2 dB gain can be represented as 5 dB gain. To convert dBm to a power gain or loss compute 10 to the power of dB/10. A 5 dB gain equates to $10^{0.5}$, or 3.162 times the input power. See https://en.wikipedia.org/wiki/DBm.

[5] Very low power outputs like -130 dBm (10^{-13} milliwatts, or 10^{-16} watts) can be used to test a receiver's input sensitivity. The accuracy of the lab-grade signal generator's output means that you can connect its output to sensitive receive circuitry directly without risk of destroying the receiver's front end.

[6] Calibration should ideally be checked regularly by a certified test lab, but most surplus units have internal self-calibration software that are generally more than adequate for amateur radio work. The self-calibration process is fully described in the user manual. For a spectrum analyzer the process takes about five minutes. I recalibrate my gear every year or two.

[7] When I bought my first SA I was unfamiliar with a lot of the features and modes of use it had, but I learned over time, and I now see an SA as an essential piece of gear in my shack. I use it all the time for purposes I had not even thought of at the time I bought it.

[8] HP is also branded "Agilent" or "Keysight" in later company incarnations. A bit of history for HP is at https://en.wikipedia.org/wiki/Hewlett-Packard.

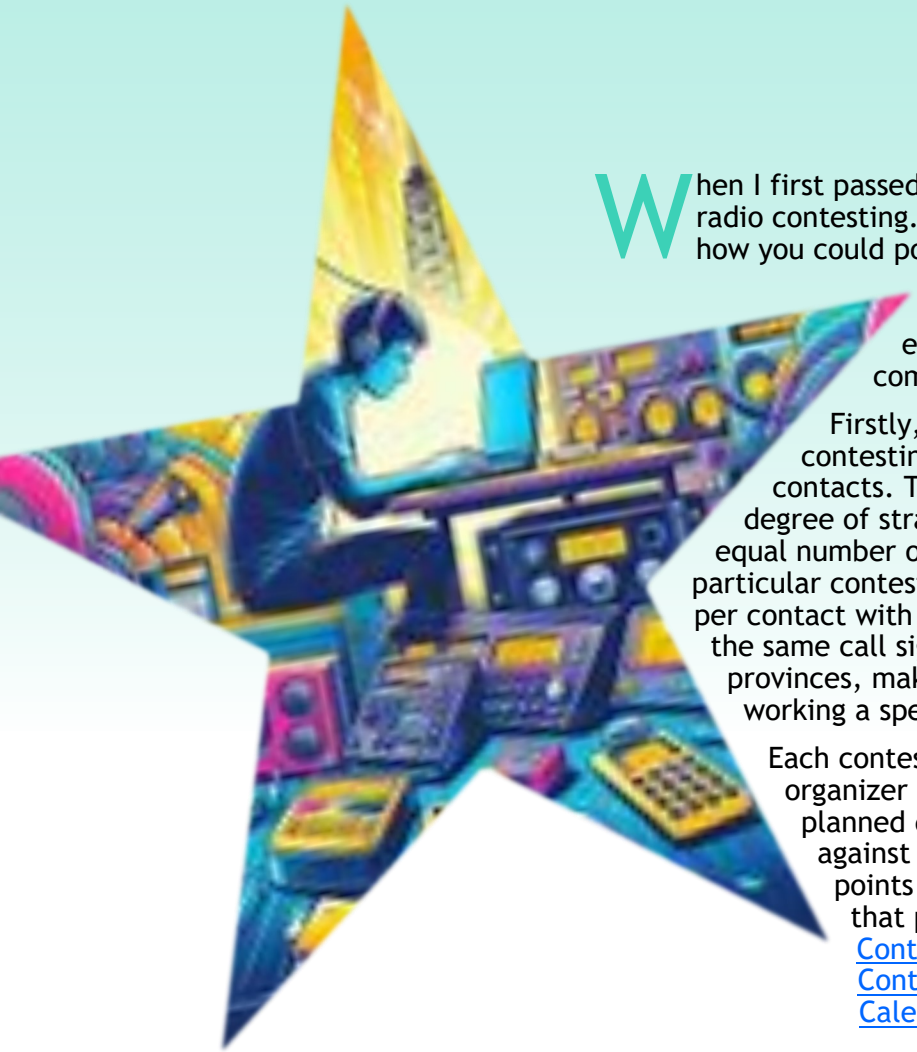
[9] Orders of magnitude is a term "thrown around" by many hobbyists that is often mis-used or mis-understood. It is very rare in actuality for some process to be hundreds or thousands, or millions of times more efficient than another process. The same hyperbole applies to the media's common use of the term "exponential growth". Hardly anything grows by millions, billions, or quadrillions of times over a period of days or months.

[10] The Sketch code and the circuitry I will describe next issue will all be available on GitHub for free download.

Radio Contesting – What's that you say?

A primer for beginner contesters

by DOUG JEFFERY VA7JDJ



When I first passed my basic course I heard people talking about radio contesting. Initially I wasn't really clear what this was or how you could possibly "contest" using a radio, but over the past year I have been on the learning curve about contesting. I thought I would share my experience so far and why you might consider coming out to participate in a contest.

Firstly, what is contesting? At the simplest level contesting is about earning points for making radio contacts. The more the better! There is also some degree of strategy because not all contacts are worth an equal number of points. The points scoring is defined in a particular contest's rules. The contest may award one point per contact with additional points or multipliers for working the same call sign on different bands or modes, working all provinces, making long distance (DX) contacts or perhaps working a specific station or group of stations.

Each contest has its own set of rules to follow and the organizer publishes the details in advance of the planned day or days. Typically, you will be competing against all other participants to make the most points from your radio contacts. There are websites that publish lists of upcoming contest like RAC Contest Calendar - Radio Amateurs of Canada, Contest Calendar (arrl.org) or WA7BNM Contest Calendar: Home to name a few. Taking a quick

look you can see that there are activities going on almost all of the time. Most, but not all, contests run on High Frequency (HF) bands so having your Basic with Honors or Advanced certification will open up the widest selection of contests to participate in. SARC's radio room is well setup for most types of contests that are run.

You may have noticed in the calendars mentioned above that there are many "modes" for contesting. It can be done with voice (AM, FM, SSB), Morse code (CW), Digital (FT4, FT8) or Radio Teletype (RTTY). I think most people start with voice. If they enjoy the challenges of the other modes contesting is an additional communication challenge that can add to your enjoyment of the hobby.

Now we know that the goal is to make the most points, so how do we prove that we made more points than the next person or club? How do we calculate the points that have been earned? That's where the log and the exchange come into play. In the club's radio room we have computers running free logging software called N1MM+. This is a widely used application that is very well supported for logging amateur radio contacts. Here is what a typical call might go like. Rx is what we hear and Tx would be what we transmit and N1MM is what data we would type into the computer. To start with most people operate in Search and Pounce (S&P) mode. Based on the contest rules they will listen in on the prescribed frequency range until they hear something like (this is for a fictious call sign and contest):

***Rx**: CQ Contest, CQ Contest Victor Echo Seven Alpha Bravo Charlie, Contest*

Having heard the call sign VE7ABC you type this into N1MM in preparation of making a contact.

***Tx**: Victor Echo Seven Sierra Alpha Romeo*

Responding to their CQ call you throw out the club's call sign and wait for a minute to see if they've copied your response. To your delight you hear:

***Rx**: Victor Echo Seven Sierra Alpha Romeo. You are 59 into Bravo Charlie*

They have heard you and are providing you the exchange information. In N1MM you would tab to the appropriate field and enter the signal report as 59 and the location as BC. Now you need to provide your exchange to them. Your response would go something like:

***Tx**: QSL! You are also 59 and our exchange is Bravo Charlie*

They would record your exchange information into their log and possibly end with a short sign off. It might go like this.

***Rx**: Thanks for the contact. 73 and good luck in the contest. Victor Echo Seven Alpha Bravo Charlie QRZ.*

At this point they have completed the contact and are calling QRZ for other operators waiting to make a QSO.

The example given above is typical of the so called Search and Pounce approach to contesting. You can search for other contestant by rolling the frequency dial and stopping to listen when you hear another station, or using the N1MM software and a feature called spotting you can see where other stations have made contact. This may be a good place for you to try making contacts too.

When you feel like you have gotten the hang of operating in Search and Pounce you might move to another way of making contacts called Running. In this scenario you would be transmitting all of the messages that were previously marked as **Rx**. While running you will stay on the same frequency sending the CQ message and answering operators who are working using Search and Pounce. Running can be very exciting, especially when a pile-up

Field Day 2023: Doug at the mic with Manvir and Mike looking on.

occurs. A pile-up is when many operators respond to your CQ call at once and you have to sort through talking to them choosing which stations to work first.

So, why would you want to do this?

This is a great way to build your radio operating experience. The communication is structured, so you don't need to worry about what to say.

You will get a chance to talk to some far away places.

You will get to use some premium equipment that you may not be able to setup at home.

You will get used to working contacts under a variety of conditions and how to adjust the equipment for best results!

In the event of an emergency your radio skills will be well practiced.

If this sounds interesting to you I recommend that you reach out to John Brodie (VA7XB), Mike Porisky (VE7YEG) or Doug Jeffery (VA7JDJ) and express your interest. We can help you to find a contest that would be good to start with and an pair you up with an experienced contester who can help to mentor you while you are getting started in contesting.

Hope to hear you on the air!

~ 73 Doug VA7JDJ

Ukraine conflict 'a bonanza' for US military – *NYT*

The conflict has become a "laboratory" for the US military, a senior American general told the newspaper.

Apparently Quansheng UV-K5(8) Ham handhelds are part of this 'laboratory'.

The US military is reportedly using the Ukraine conflict to test a new artificial intelligence technology that helps detect targets on the battlefield using drone footage, the New York Times reported on Tuesday.

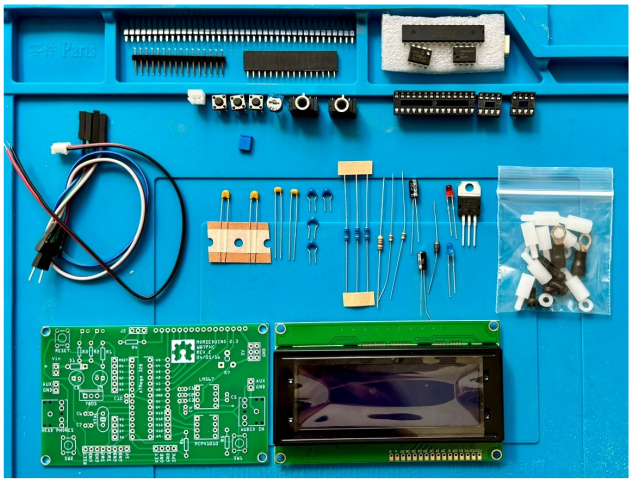
Dubbed Project Maven, research into the technology was initially picked up as a government contract by Google six years ago, according to the outlet. However, after pushback from engineers and employees, who did not want to take part in building an AI tool for military use, the tech giant stepped away from the project, which was picked up by other contractors.

~https://thepressunited.com/updates/ukraine-conflict-a-bonanza-for-us-military-nyt/

The CW Decoder

SARC's latest club member build project

by JOHN SCHOUTEN VE7TI

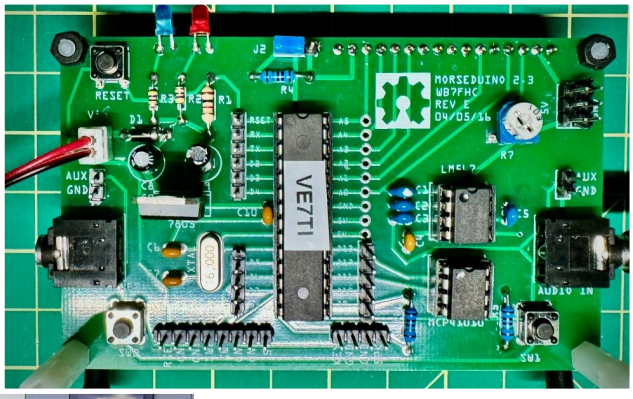


We're at it again, the need to build, and to smell solder smoke is unquenchable. This time the project was recommended by Dino VE7NX. It is Budd WB7HFC who is scratching the build itch. One of Budd's projects is the MorseDuino 2, a medium skill level CW decoder that uses a pre-programmed controller to take radio audio (or your own practice CW) and prints it out on a 20 x 4 LCD panel.

The kit is well documented and comes with a quality double-sided circuit board that uses all through-the-hole components for ease of assembly. Budd has a high speed build video on YouTube that guides the builder through the construction process. I built mine at a leisurely pace at home in about 2 hours and Dino supervised a club build on April 20th.

Full documentation is available on Budd's website at: http://wb7fhc.com/m2-decoder-walk-around.html and we will look at other means of decoding CW.

~ John VE7TI



Daniel Romila VE7LCG

Daniel's Workbench

Antenna Sharing

A word of caution about a risky product

This is a bad review. A do not buy. I burned out my SDR receiver, although it had additional protection diodes, that I'd installed.

I was looking for more useful toys for my transceivers, and an antenna switch would have been something that – somehow – I needed. The truth is I do not need anything. That does not mean I do not buy things. My attention was drawn by one particular item from search results, named "Antenna Sharer". I paid 44.59 CAD (=33.62 USD=30.51 EURO=622.78 ZAR), shipping and taxes included, at the beginning of 2024 for this item:

Impedance: 50Ω
Frequency range: DC -160MHz
Maximum transmit power: 100W
RF sensing threshold: <10mW
Opening time: <20ms / Release time: <190ms
Insertion loss: <0.3dB @ 144MHz
RX isolation:> 38dB @ 144MHz

This antenna 'sharer' does not have much explanation on websites, and it might not be clear what it does. In short, it permits adding an additional receiver, such as an SDR receiver, to the transceiver. It is comfortable to have a spectrum view around the frequency where the transmitter

sends the signal during reception. My transceiver does not have a spectrum display, so such an arrangement, using an antenna sharer would allow me to see – for example – the full 2 meter band, and see which repeaters have activity. The tuning for the additional receiver/SDR receiver is done separately, so it is not exactly comfortable to continuously move the working band and working frequency.

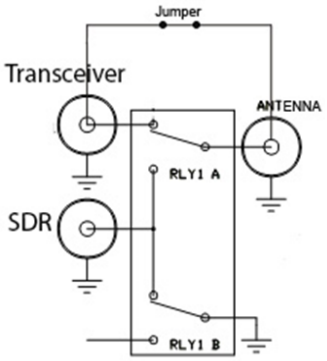
Let's take the simple case of an FM transceiver for the 2 meter band, as I mostly use that. The antenna sharer has two possible modes of functioning as shown above right.

The antenna is permanently connected to the transceiver. The SDR connector is shorted to ground during transmission and switched to the antenna during reception.

The antenna is connected to the transceiver only during the transmission. For reception, only the SDR connection is moved from ground to the antenna, and the transceiver is not given access to the antenna. So reception is no longer possible with the receiving part of the transceiver, and it is mandatory to use an external (SDR connected) receiver. In short, an external receiver replaces the receiving part of the transceiver.

The functioning in mode 1 or 2 is decided by an internal jumper. By default, the jumper is set for mode 2, at least so on the item I bought. The switching is decided by electronic circuitry sensing FM transmission (RF power). For SSB it is better to use an external PTT command, connected into a dedicated connector. I made a simplified equivalent schematic for the simple FM example, putting a mechanical relay in the schematic instead of the electronic circuitry. In the schematic I put only one equivalent relay, and I did not complicate that with a second relay shorting the transceiver's connector to ground during reception in Mode 2. (The antenna sharer I bought has 3 separate relays.)

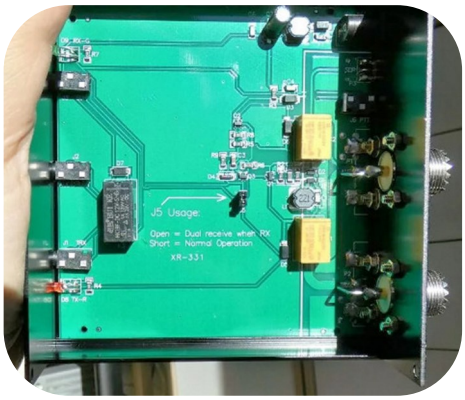
The next picture shows how the device looks inside. The jumper is clearly marked with its usage for Mode 1 and Mode 2.



The antenna sharer looked well built and reliable. Once I saw the device, I thought that it would take me one day to build it.

But I was thinking about 4 antenna connectors, power connector(s) and cable, LEDs and electronic circuitry – and assembling the case. So, $45 CAD and no work looked like a better choice, so I bought the antenna sharer ready made.

Now, after I received the product and having verified it, I should have built it myself. Although it is declared as working up to 160 MHz, in the 144 MHz band it lost significant power. I have 50 Watts, and when intercalating the antenna sharer, it looked like I was getting only 5 Watts out. I do not have a RF power meter for precise measurement.



The most disturbing finding is insufficient isolation for the SDR receiver, which burned my RSP1 – probably only the protection diodes, but it still made my SDR receiver unusable. There were no comments at all when I bought this product but now, having experienced how bad it is, the Internet is full of negative reviews. That was too late for me, but maybe a useful warning for you.

~ Daniel VE7LCG

Sadly, this is Daniels last article for the foreseeable future. He has decided to take a break to devote his time to other endeavours. Thank you Daniel for the dozens of article that you have contributed to The Communicator over the years.

The Anderson Powerpole

It has become an amateur radio standard

The Anderson Powerpole is a family of electrical connectors by Anderson Power Products, although plug compatible connectors are now available from alternate sources. Specific variants of this series of connectors have become de facto standards for conveying "higher power" direct current (DC) electrical power, although these standards are inconsistent and sometimes ignored.

Overview

Powerpole connectors are physically and electrically hermaphroditic, thus avoiding the need to worry about which end is the plug and which the socket, or which end has the correct polarity. This contrasts with the physically—but not electrically—hermaphroditic two-wire trailer plug.

Powerpole connectors are available with current ratings up to 180 amperes. The 15/30/45 ampere-rated connectors are the most common, using the same plastic housing and differing only in the metal contact inserted into the housing. The contact is selected based on the ampacity and wire gauge. The colors can be used to signify signal types (power, speaker, logic, microphone audio, etc.) or differing voltages. Powerpole connectors can be attached side to side and also stacked on top of each other to make, for example, four connections with one plug insertion. The contacts are rated for 100,000 no-load insertions and 250 hot-plugs at full load.

Larger Powerpole connectors (the SB/Multipole series) with two or three contacts in one molded housing are commonly used in various industrial settings, including as a battery connection for some uninterruptible power supplies (UPS), removable vehicle winches, many electric forklifts, and other electric vehicles. They range from 50 to 500 amps, 600 volts.

Competitors

Some of Anderson's earlier patents have expired, thus other manufacturers have released plug-compatible connectors, such as "AMP Power Series" by Tyco / TE Connectivity, Sermos, Lightspeed and many Chinese knock-offs.

The Powerpole connector was designed and patented by "Albert & J M Anderson Mfg Comp", then more recently by "Anderson Power Products".

Colour

Different keying for each colour in the SB50 series. Note that black and grey are keyed the same making them interchangeable.

For the larger multipole design, which is available in up to 700 A sizes, each color is physically keyed so as to mate only with a like colored connector, and Anderson published a list of recommended voltage for each color as listed in the table *[right]*.

Amateur radio

The Powerpole connector has been adopted by many segments of the Amateur Radio (Ham Radio) community as their standard 12-volt DC power connector for everything from radios to DC power sources to accessories. Three notable groups are the Amateur Radio Emergency Service (ARES), the Radio Amateur Civil Emergency Service (RACES) and the Wireless Institute Civil Emergency Network (WICEN). Standardization allows equipment owned by different hams to be used together without needing adapters in emergencies, at public service events, at field day, during contests, when borrowing equipment, etc.

The Anderson Powerpole connector is more expensive than the older de facto standards of the two-wire trailer plug and the Molex connector but provides a more reliable electrical connection (both mechanically and electrically), and is easier to adapt to a wider range of wire gauges.

Anderson colour	Anderson suggested voltage	Alternate non-Anderson-suggested uses
Yellow	12 V	Some APC brand 24 V internal UPS battery packs.
Orange	18 V	See the note in the last paragraph of the Amateur Radio section below
Red	24 V	**Wide use in the Amateur radio community at +12 VDC (13.8 VDC) for emergency power and mobile radio use.** Used by Warn brand of automotive winches at +12 VDC (13.8 VDC) power to the winch motor. Sometimes used by outdoor enthusiasts for +12 VDC (13.8 VDC) battery charging, especially with photovoltaic panels. Some model railroads at +12 VDC. Some robots, such as FIRST Robotics Competition. Some Tripp Lite brand 24 VDC external UPS battery packs.
Gray	36 V	Some +12 VDC (13.8 V) automotive use in Australia, such as RV and camper battery charging, pumps, solar power systems. Frequently used by outdoor enthusiasts for 12 VDC (13.8 VDC) battery systems. Some APC brand 24 VDC internal and external UPS battery packs. Some Tripp Lite brand 38 VDC external UPS battery packs. Some Lee's brand 36 VDC forklift traction battery connections.
Blue	48 V	Some APC and Tripp Lite brand 48 VDC external UPS battery packs. +9 VDC in some audio equipment.
Green	72 V	Green is the worldwide color for the frame ground, safety, or "earth" / "earthing" ground.
Black	80 V	Ground for amateur radio, automotive/RV, winches, model railroads, robotics.
Brown	96 V	No standard
Purple	120 V	-48 VDC in some telecommunications
White	144 V	+5 VDC in some computer equipment.

Another advantage over the older trailer or Molex connectors is the Powerpole's superior ratings to withstand 100,000 no-load insertions and 250 hot-plugs at full load. The specific hermaphroditic nature of the Powerpoles is a significant advantage since batteries can be both a power source or a power sink, a power supply can be connected to a radio and/or a battery, and multiple batteries, radios, and/or redundant power sources can be connected in parallel using the same power distribution panels. Connectors in which non-hermaphroditic contacts are arranged in a hermaphroditic arrangement (such as bullet connectors used in low end solar equipment) can be electrically incompatible (reverse polarity damages equipment) and non-hermaphroditic connectors can be mechanically incompatible with each other (won't mate).

Many pieces of amateur radio equipment run on 12-volt DC automotive voltage, which is also called 13.8-volt DC. The voltage delivered by a lead–acid battery with six-cells used as an automotive battery will vary depending on various electrical loads in a vehicle. Without loads the battery will float from 11.7 to 12.8 volts, and while charging from an alternator the voltage will increase to 13.8–14.4 volts DC.

For use in amateur radio, the community has adopted a standard color code, polarity, and specific physical arrangement for assembling pairs of Powerpole connectors. One red and one black Powerpole housing can be physically arranged in 4 topologically different mechanical orientations (red left, red right, red top, red bottom—when viewed from contact side with tongue up), 2 of which are mechanically incompatible (connectors won't mate with ARES) and 1 is electrically incompatible (will mate but reverse polarity) with the ARES standard; there are also additional unusual configurations in which one housing is rotated 90 degrees. The standard is red positive and black negative. When viewed from the contact side, a mnemonic for remembering the arrangement is: "Red Right — Tongue [on] Top" (note the first letter alliteration).

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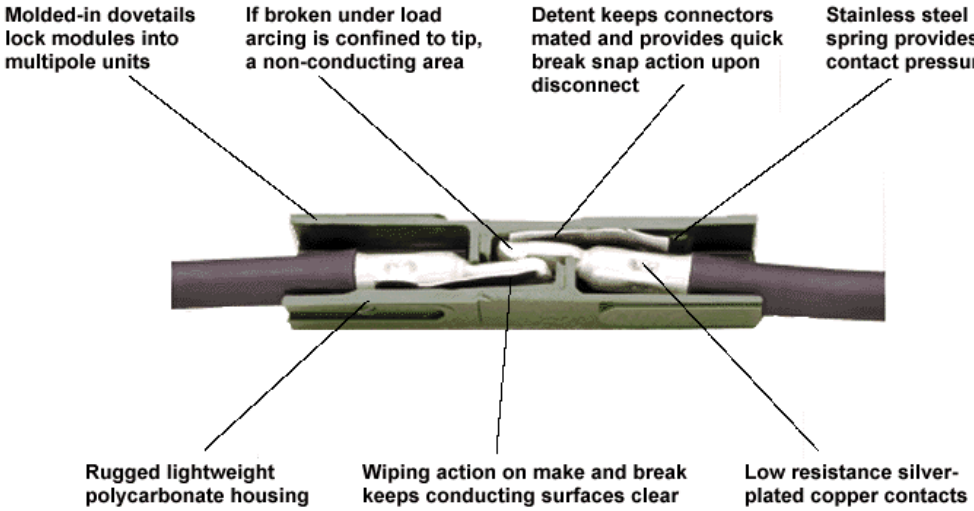


The Emergency Tuner Function

by JOHN SCHOUTEN VE7TI

John Schouten VE7TI
Has both an iCOM 7300 and 9700 and is fascinated by the 'hidden' features of these transceivers.

The Icom IC-7300 and IC-7610 boast a handy feature called the Emergency Tuner Mode. This mode allows the built-in tuner to operate with a wider tuning range beyond the usual 3:1 match. This could be particularly helpful in a POTA, SOTA or other situation where your antenna may be compromised.

Here's how it works:

Tuning Range

In Emergency Tuner Mode, the radio can tune antennas that might not typically match well. For instance, it has been verified that the IC-7300 can tune an 88-foot dipole antenna positioned at 25 feet above the ground on various bands, including 80m, 40m, 30m, 20m, 17m, 15m, 12m, 10m, and 6m.

Power Limit

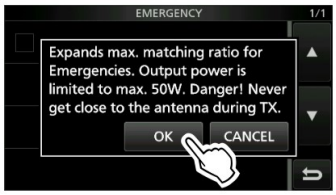
Keep in mind that Emergency Tuner Mode limits the power output to 50 watts, even if you've set the power level higher than that. So, it's a great option for emergency situations when you need to make the most of your available antenna, even with reduced power.

Emergency mode (Tuner)

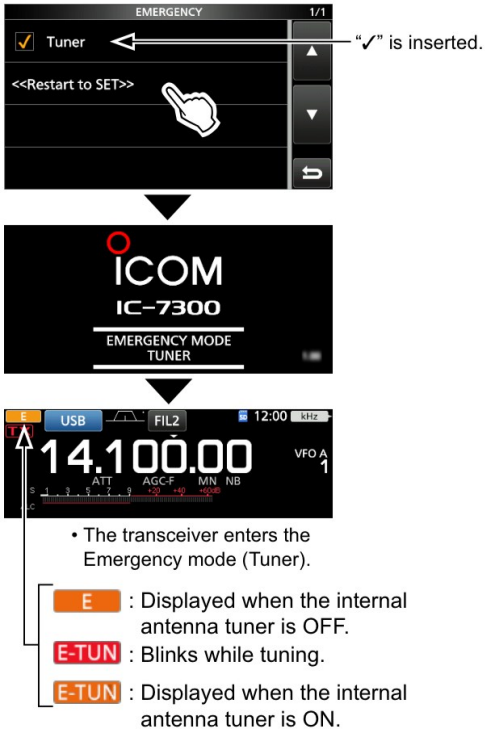
The Emergency mode (Tuner) enables you to use the internal antenna tuner in an emergency situation, but limits the maximum output power to 50 W.
In an emergency situation, where the only antenna you have has a high SWR, you can use the antenna tuner even if the SWR is more than 3:1.

1. Open the EMERGENCY screen.
   MENU » SET > Others > **Emergency**
2. Touch "Tuner."

3. Touch [OK].



4. Touch "<<Restart to SET>>" to restart the transceiver.



• The transceiver enters the Emergency mode (Tuner).

- **E** : Displayed when the internal antenna tuner is OFF.
- **E-TUN** : Blinks while tuning.
- **E-TUN** : Displayed when the internal antenna tuner is ON.

The process is described in the user manual for the IC-7300 on page 7-3 *[see the graphic left]*. You can enable Emergency Tuner Mode on your IC-7300 or IC-7610 by following these steps:

- Navigate to the Menu.
- Go to Set.
- Select Others.
- Choose Emergency.
- Highlight the Tuner check box
- Touch <<Restart to Set>>.

Once you've done this, the unit will power cycle and the orange E tuner icon will appear, indicating that the radio is in Emergency Tuner Mode. Remember, this feature can be quite handy when you need to get your signal out under challenging conditions!

To reset, just repeat the steps and uncheck the 'Emergency' box.

For a visual walkthrough, you can also check out this video: [Emergency Tuner Mode for Icom IC-7300]

~ John VE7TI

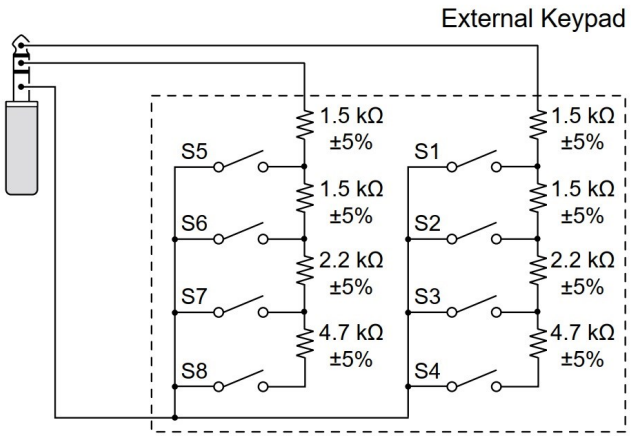
I think it's due for an oil change

The iCOM IC-705

Message controller with built-in paddle

By LUC ON7DQ

The IC-705 manual shows a simple circuit to add some message buttons to the paddle/key input (see page 13-2 in the Basic Manual).



source: Icom IC-705 manual

Keying the rig for CW is done by grounding the TIP (Dot) or RING (Dash) of the connector, but when you connect a certain resistance to ground, one of the 8 stored messages is transmitted.

This works for CW, Voice and RTTY, if you don't forget to change the appropriate settings via *MENU > Set > Connectors > External Keypad*.

Such a box with buttons is available commercially, like the one *[right]* from Wimo [1].

source : Wimo.de

Cheaper versions can be found on Amazon [2], Ali Express [3], etc. Homebrew projects for different Icom rigs can be found on the website of ON5IA [4].

On the box from Wimo, two buttons are provided to key some CW, but I doubt you will make very long QSO's with those buttons. It's probably OK for an emergency, the same as keying with the microphone A-B buttons. But for real CW ragchewing, you still need to connect an external key or paddle.

So that got me inspired to brew my own … and include the paddle IN the box. And it cost me virtually nothing !
The box I used was from a small laptop adapter. The large hole where the mains socket used to be, is now the opening for the paddle.

I didn't really need all 8 messages for regular SOTA or POTA operation, so I made a box with only four buttons, connected to the TIP, and a 3.5mm

connector. The box is connected to the IC-705 with a regular 3.5 mm stereo cable.

If I ever wish to use the other 4 messages, I could easily add a small slide switch to move the resistor chain to the RING, for messages 5 - 8.
And if I want to use an external key or paddle, I can still add another 3.5 mm connector, in parallel to the first one, or add a short cable to the rig, and use the connector for the key or paddle.

The paddle was inspired by the work of Carel, PA0CMU, who made a few nice CW paddles from PCB (copper clad) boards [5]

So I took some pieces of single sided copper clad board, and started cutting and filing :

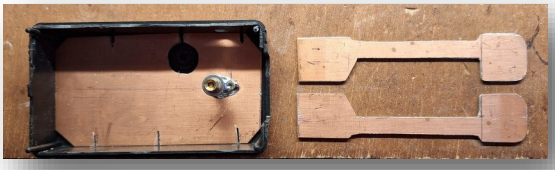
a bottom plate for the box (8 cm x 4.5 cm), glued inside the box

two paddles, with copper removed where it is not needed (outer dimension 9 cm x 2cm), soldered to the bottom plate at the back end

removing part of the middle of the paddles to reduce the tension

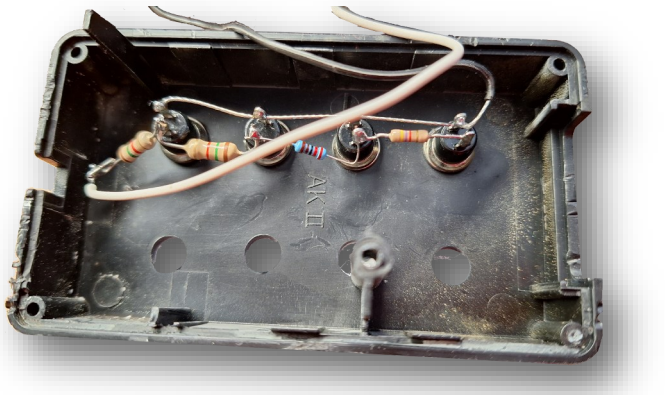
A HEX standoff with a washer is soldered to the bottom plate as the center ground contact

This is what I got before assembling :



To make sure the paddles wouldn't collapse or come loose with "heavy copper pounding", I added a small piece of PCB between the two paddle arms. A 3.5 mm stereo connector is mounted on the side of the box. This is the finished paddle (bottom part).

The top cover contains the four buttons and four resistors, wired as in the diagram from the manual.



As you can see, I drilled the holes for 8 buttons, but later decided to mount only 4, hi. The empty holes are covered with a label. See the picture at the top for the final result.

Note : there is no provision to adjust the paddle spacing (yet), but changing the washer for a different size would solve that. I chose a rather wide spacing, since I may use the paddles with gloves during a winter SOTA or POTA activation.

The tension of the paddles is also fixed, but I think I got it just right by filing away enough of the PCB material in the middle of the paddles. Maybe a spring, or some small magnets could be added, but I didn't want to make it too complicated.

And it works !

I did a POTA activation recently, and made 16 CW QSO's in just 26 minutes, the only errors were 'operator' errors, not the fault of the paddle, hi.

Good luck building this project, let me know how it went and if you like it !

73 de Luc, ON7DQ (e-mail address is good on QRZ.com)

https://on7dq.blogspot.com

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2. Amazon https://www.amazon.com/WINDCAMP-External-Control-Keyboard-Applicable/dp/B0B3XP2C72
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4. ON5IA https://www.golb.be/icom-external-keypad-project/
5. PA0CMU https://www.pa0cmu.nl/paddle.html

A Weatherproofing Experiment:

PL-259 Connections

by JOHN WHITE VA7JW

The PL-259 is the dominant male coaxial cable connector used for indoor and outdoor coax cable connectivity. Outdoor service is far more demanding due to weather. The PL-259 is common as they are not waterproof. This can significantly and quickly degrade the electrical properties of the connection. Note this experiment deals only with liquid water, not freezing issues, nor the effects of ultraviolet damage or temperature cycling issues. Pity the poor outdoor PL connector.

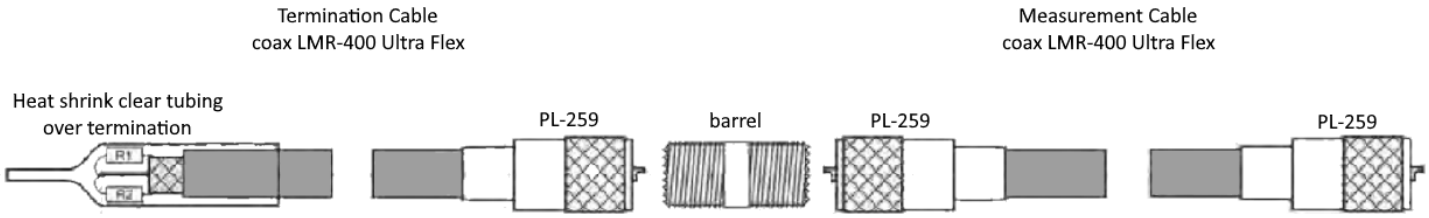
Most station transmission line systems have inserted components such as power and standing wave ratio (SWR) meters, filters, switches, and of course PL-259 connectors. These items will present a characteristic impedance close to the 50 Ohm Z_o of the transmission line. However, even a small variation from the transmission line Z_o by such components will be seen as an impedance discontinuity to the forward wave propagating down the line. Discontinuities inherently result in a reflection of a portion of the forward power which is reflected back to the source, being lost to the antenna.

Overall, the discontinuity is small and reflected power is minimal, and so the PL-259 works well enough, provided the connection is tight and dry. Water in the coax and connectors will manifest itself as loss and will attenuate the transmitted incident power as well as reflected power due to antenna mismatch. The SWR meter will report a lower SWR due to the attenuated reflected wave indicating better performance which is not the case.

The SWR meter, commonly connected in-line, constantly advises us of the system SWR, that being the amount of reflected power, due in part to connector impedance discontinuities. Another way to measure impedance discontinuity is by Return Loss (RL). This also measures the ratio of Forward power to Reflected power as does SWR, but expresses it in dB. The table on the next page shows the relationship of SWR to RL in terms of percent Reflected Power.

In this experiment both SWR and RL are measured using the Array Solutions, AIM-4170 Antenna Analyzer over the frequency range of 1 to 150 MHz.

John White VA7JW was first licensed in 1959. He graduated in Electrical Engineering from the University of British Columbia and in 1968 he obtained his Professional Engineer qualification. From 1965 through 2002, he worked in the telecommunications manufacturing industry in Vancouver, notably Lenkurt Electric, MPR Tech, Glenayre and Norsat.



Weatherproofing test

Residing in our wet VE7 coastal climate, the question arises, "what techniques are most effective in protecting the connections". A controlled experiment is needed to objectively measure the effectiveness of various weatherproofing techniques commonly employed to PL-259 connectors. This would require building several identical test cables, each being "weatherproofed" differently.

Certain parameters would be measured under identical and consistently wet conditions; having no idea how to do this outside in the weather, under widely varying ranges of temperature and moisture, how measurements could be performed, and just how long might that take. Therefore, an indoor controlled-environment bench test is needed to make valid comparisons. This led to the construction of eight identical test cables, using LMR-400-UF (ultraflex) coax, each with a unique weatherproofing applied over a central PL-259 connection.

Referring to the photo below left, and the diagram above, each of the eight test cables consists of two sub-cables. One sub-cable is terminated at one end with a metal film resistor trimmed to 50 ohms, within 0.1 ohm, and a PL-259 is connected to the other end. This is the Termination Cable. The second sub-cable is terminated at both ends with PL-259s. This is the Measurement Cable. The two cables are joined with a Female-Female SO-239 style barrel and weatherproofing is applied over the connection.

Note: Please refer to the insert at the end of this article for the techniques used in the assembly of the PL-259 on to the coax cable.

How to test for water

A continuous immersion process was used to accelerate the ingress of water and the rate of degradation of the connections. Measurements would be made in comfort over a few weeks at room temperature. A plastic tub was modified to hold cable joints under water, keeping the connections continuously wet and the ends dry *[photo below left]*.

Weatherproofing techniques

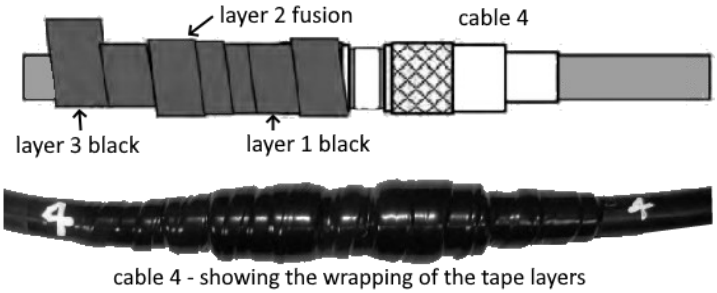
Five different, commonly available waterproofing materials are listed. The eight cables were dressed using either singly or

Waterproofing techniques	
1	No weatherproofing applied
2	Black Electrical Tape. Scotch ® Super 88, a durabletape for the outdoor environment
3	Black Electrical Tape + a stretchable rubber, self-vulcanizing "Fusion" tape
4	Black Electrical Tape + Fusion tape + Black Electrical Tape
5	STUF ® a Dielectric Grease which fills voids and displaces water in a connection

SWR—Return loss—Reflected power[2]										
SWR	1.1:1	1.2:1	1	13:1	1.4:1	1.5:1	2:1	3:1	4:1	5:1	10:1
RL dB	26	21		18	16	14	9.5	6	4.4	3.5	1.7
Reflected Power %	0.23	0.8		1.7	2.8	4	11	25	36	44	67

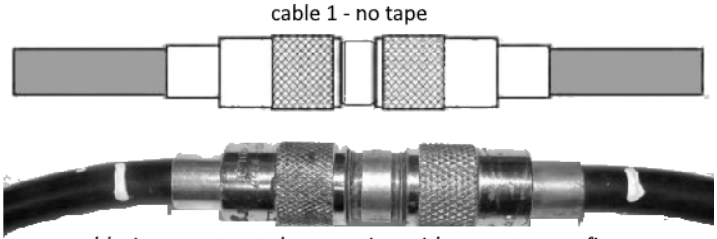
[1] To view Forward and Reflected waves resulting in a standing wave, visit https://en.wikipedia.org/wiki/File:Standing_wave_2.gif
[2] See http://radio.feld.cvut.cz/personal/matejka/download/VSWR%20table.pdf table for relationship between SWR, RL, Power, & Losses.

Waterproofing techniques (continued)	
6	STUF + Black Electrical Tape
7	Black Electrical Tape + Coax Seal ®, a hand-moldable, tacky, black plastic mastic
8	Generic Heat Shrink tubing with as internal "Glue"that seals the connection



cable 4 - showing the wrapping of the tape layers

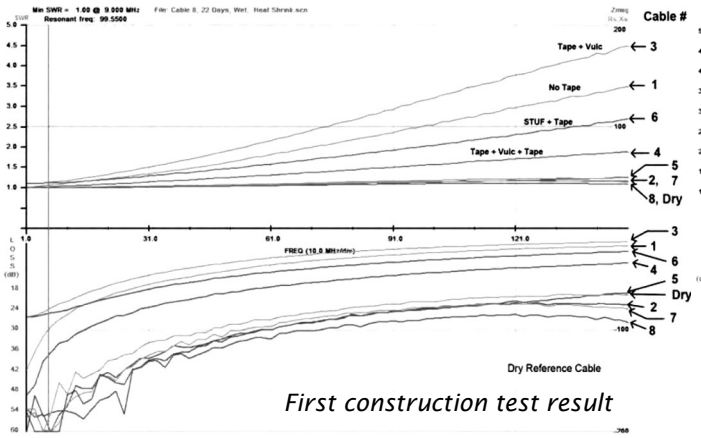
combined materials according to the table. Please refer to the materials list for details. Two of the eight cable preparations are shown as examples. Cable #1, an untreated connection with no waterproofing applied. Cable #4, shows the wrapping of the various tape layers. Each tape is overlapped 50% as applied.



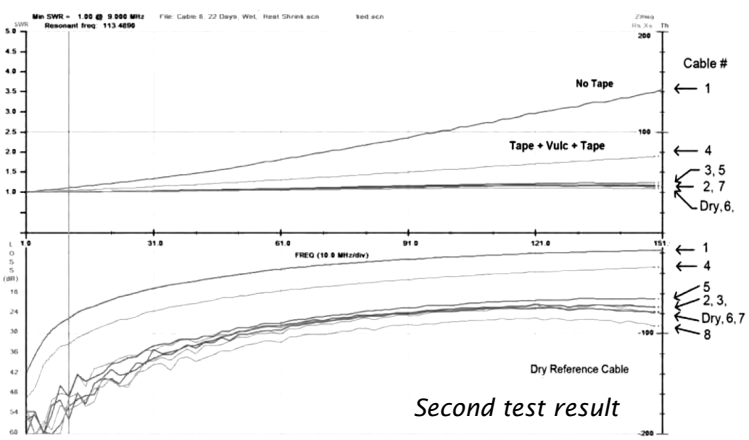
cable 1 - an untreated connection with no waterproofing

Test plan

Each cable was characterized when dry, which established the "baseline" against planned wet measurements. The DC resistance was measured using a Fluke 73 DVM. The DC termination resistance of all cables was trimmed to 50 ohms +/- 0.1 ohm. The SWR and RL were measured using the AIM 4170 Antenna Analyzer. All cables measured the same when dry. The cables were immersed and measured nominally at 1 day, 2 days, 6 days, 12 days, and 22 days to record changes in DC resistance, SWR, and RL. At the end of 22 days, each cable was stripped of its weather protection and was examined for ingress of moisture.



First construction test result



Second test result

Test results

After 22 days wet, the change in performance is well illustrated in the graph on the previous page, being a composite of the SWR and RL sweeps of all eight cables. Half the cables exhibited significant degradation over the 22 wet days. All tapes were removed, and all PL-259 connectors and barrels were inspected for water ingress.

Deficiencies were noted, particularly with Cables # 3, 4, and 6. Cable #1 was not expected to perform at all well, and it didn't.

Erratic DC resistances were noted in some measurements with variations of greater than a few ohms to open circuit under agitation of the joint. Tapes were observed to sometimes have lost adhesion and developed loose ends and were starting to unravel. A loose connection was noted; the PL was not tight to the Barrel. Most of all, water was observed under all the tapes.

The suspect cables (3, 4, and 6) were rebuilt with greater care and attention in the application of the weatherproofing tapes, and those with STUF were reconstructed ensuring that the PL to Barrel mechanical connection was snugged tight to squeeze out surplus grease. The PL Shells were gently tightened with slip-jaw pliers in all cases. Cable # 2 performed beyond expectation; it was rebuilt to confirm the performance. The reworked cables were retested using the same techniques under the same 22-day regime.

Reworked test results

The second batch of tests were much improved as shown in the second test result graph *[right on the previous page]*. As before, this graph shows the change in SWR and RL using Day 0, Dry as a reference, to Day 22, Wet. Cable 1 was not expected to improve, and it did not. Cable 4 showed little improvement.

Findings

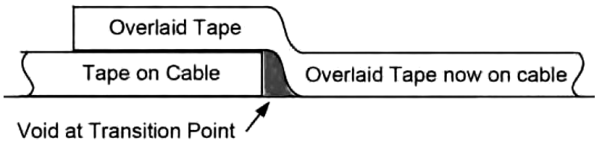
After the 22-day sweeps were completed, the weatherproofing materials were carefully removed and inspected as described earlier.

The biggest surprise continued to be the ingress of water under all tapes. When removing the tapes, a totally unexpected leakage path was revealed as shown in the graphic *[next page left]*. The overlapping of tape as it is wound on the cable, appears to create an unavoidable, continuous and miniscule void where the overlap steps down off the tape, on to the surface of the cable. This generates a spiraling leakage path for moisture to wick along the cable surface up to the PL-259. This wet path was observed when removing the tapes.

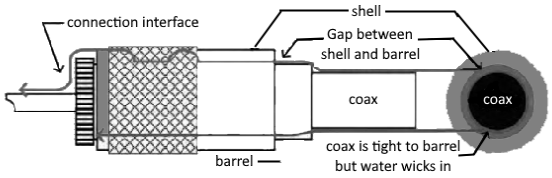
Given time, water variously accumulated on the PL-259's barrel and shell. Once water appears on or around the PL-259, it will likely enter the connection as shown in the graphic *[next page right]*. The most significant water ingress point is indicated by the upper grey line. A gap between the shell and the barrel of the PL-259, varying by manufacturer, was variously measured anywhere from 0.01-inch to 0.05-inch.

This allows water to flow unimpeded all around the outside of, and along the barrel, onto the face of the connection where it can accumulate in the void between the connector faces. Moisture here would account for the significant effects seen on the SWR and RL graphs.

A lesser path exists where water wicks in between the outside of the coax jacket and the internal threads of the barrel, indicated by the lower arrow. Tight, but not waterproof. Water thus flows to the interior of the barrel and enters the chamber at the inside end of the barrel where the coax end has been exposed for soldering. This opens the possibly of water wicking into the coax itself. SWR and RL would be further degraded.



Overlapping tape water channel



Water ingress paths

The bottom line

1. **Keep water out:** Heat Shrink or Coax Seal will do that and preserve the integrity of the connection. A heat gun (not flame) is required to perform the Heat Shrink operation.
2. **Probably keep water out:** A very effective approach would be to apply STUF to the barrel face as well as the PL-259 face and the threads of the barrel and shell, then tighten. Wrap a layer of black electrical tape over the joint. Then use coax seal to seal the ends of the black tape against leakage and prevent unravelling.
   This construction was later tested on its own for 21 days immersed. Performance did not change from Day 0, dry. Still, moisture was detected under the tape. STUF saved the day by filling the connection interfaces, displacing water, as none was seen.
3. **You may not keep water out:** Tapes alone leak, as were seen by the wicking of moisture into the connection. Layering of tapes does not improve matters much as the leak mechanism remains.
4. Over the HF range, all cables came within a 2:1 SWR when assembly techniques were paid attention to. For VHF, degradation becomes more evident and greater attention to weatherproofing is advised.

Materials

- 3M Scotch Super 88 Electrical Tape https://www.3mcanada.ca/3M/en_CA/p/
- Self-Vulcanizing Fusion Tape #122 https://www.plymouthrubber.com/productos/
- STUF: http://www.crossdevices.com/
- Coax Seal: https://coaxseal.com/products/

~ John VA7JW

John's guide for the best installation of a PL-259 'UHF' connector follows on the next page.

A recent Saturday Denny's group. Come join us!

Installation of the PL-259 to Coax

The integrity of the connection of the PL-259 to the coax is critical to this experiment. The technique used is described here. All coax connectors are installed at VA7JW this way including the test specimens.

Requirement 1: Ensure absolutely each PL-259 is soldered to the coax braid at all four solder holes, as well as the centre conductor to the centre pin to ensure electrical stability.

Requirement 2: Ensure each of the four solder holes and the centre pin of the PL-259, are soldered shut to prevent the possibility of water entry here, even though the PL has leaks elsewhere.

LMR-400 was used due to the construction of the cable. It has an aluminum foil on top of the dielectric and underneath the factory tinned braid. While this provides 100% electrical shielding, there is a bonus to be had. The process of soldering the braid to the barrel often involves considerable heat to be applied for some time to induce solder flow between the barrel and braid. Without foil to contain dielectric melt, the dielectric will ooze up through the braid, fouling the solder connection. In many cases the braid is not even tight to the barrel, and little to no heat transfer takes place, and so the connection is either fouled or incomplete, or both. The four solder holes, being small, fill with solder quickly without any confirmation that the braid underneath has actually picked up solder.

The solution to these problems is to cut open a slot between any two adjacent holes as shown below, with a Dremel® tool equipped with a cut-off disk .

Tin the LMR factory tinned braid with a little more solder. Screw the connector on to the coax and watch the braid pass by the slot and become fully engaged on the coax cable. Clamp and hold the coax steady in a vise.

Take a hot, tinned soldering iron of considerable thermal mass and place the tip in the slot, heating both the barrel and the tinned braid at the same time. Start feeding solder in. Very soon solder will flow on both the braid and the barrel. You can visually verify the connectivity.

While the assembly is hot, go to the two remaining holes, insert the tip of the iron into the hole and feed in solder which will wick into the hole almost immediately. Once again visually inspect the solder joint. The benefits of this procedure are:

1. visual verification of the solder joints; and
2. containment of dielectric melt compromising the joint due to the foil.

While hot, the centre pin must be wiped clean with a rag down to the original diameter of the centre pin; or be filed down when cold to ensure the connection from the PL-269 to either an SO-239 or F-F barrel is smooth with no blobs to distort the female connector receptacle.

~ John VA7JW

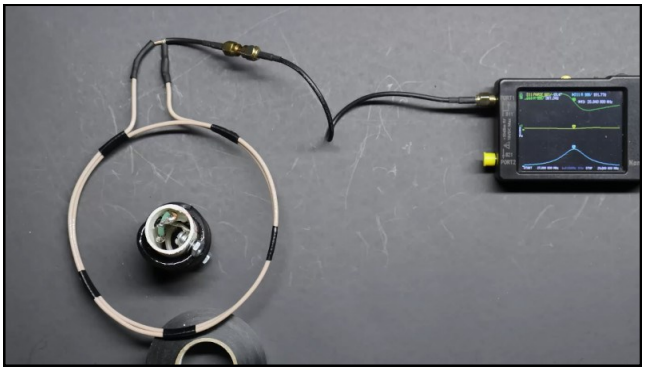
The NanoVNA as a dip meter

Another useful NanoVNA application

by JENNY LIST—HACKADAY

A staple of the radio amateur's arsenal of test equipment in previous decades was the dip meter. This was a variable frequency oscillator whose coil would be placed near the circuit to be tested, and which would show an abrupt current dip on a moving coil meter when its frequency matched the resonant frequency of what it was testing. For some reason the extremely useful devices seem hard to come by in 2024, so [Rick's Ham Shack] has come along with a guide to using a nanoVNA in their place.

It's a simple enough technique, indeed it's a basic part of using these instruments, with a large sensor coil connected to the output port and a frequency sweep set up on the VNA. The reactance graph then shows any resonant peaks it finds in the frequency range, something easily demonstrated in the video below the break by putting a 20 meter (14 MHz) trap in the coil and seeing an immediate clear peak.



For many readers this will not be news, but for those who've not used a VNA before it's a quick and easy demo of an immediate use for these extremely versatile instruments. For those of us who received our callsigns long ago it's nothing short of miraculous that a functional VNA can be picked up at such a reasonable price, and we'd go as far as to suggest that non radio amateurs might find one useful, too. Read our review, if you're interested.

~ Jenny List

The original article is on HACKADAY at: https://hackaday.com/2024/04/03/a-nanovna-as-a-dip-meter/. HACKADAY is a hardware hacking website. It was founded in 2004 as a web magazine

The Beverage Antenna

A time-tested receiving antenna

By JOHN SCHOUTEN VE7TI

John Schouten VE7TI is an instructor with Surrey Amateur Radio Communications

The Beverage antenna, named after its inventor Harold H. Beverage, an American radio pioneer, is also known as a "wave antenna", is a long-wire receiving antenna primarily used in the low frequency and medium frequency radio bands. Beverage patented the design in 1922. This antenna is a testament to innovation in long-wave radio communications.

Beverage first developed the Beverage antenna in 1921 while working at the Radio Corporation of America (RCA). The invention came about as a result of Beverage's efforts to improve the reception of transatlantic radio signals. By 1921, Beverage long-wave receiving antennas up to 14 km (9 miles) long had been installed at RCA's Riverhead, New York, Belfast, Maine, Belmar, New Jersey, and Chatham, Massachusetts receiver stations for transatlantic radiotelegraphy traffic. Perhaps the largest Beverage antenna—an array of four phased Beverages 5 km (3 miles) long and 3 km (2 miles) wide—was built by AT&T in Houlton, Maine, for the first transatlantic telephone system opened in 1927.

It's unique in that it's a traveling wave antenna, meaning the radio frequency current travels in one direction along the wire, in the same direction as the radio waves. This is unlike other wire antennas such as dipole or monopole antennas which act as resonators, with the radio currents traveling in both directions along the element, bouncing back and forth between the ends as standing waves.

The advantages of the Beverage antenna include excellent directivity, a wider bandwidth than resonant antennas, and a strong ability to receive distant and overseas transmitters. However, its physical size requires considerable land area, and it cannot rotate to change the direction of reception. Installations often use multiple Beverage antennas to provide wide azimuth coverage.

On the other hand, other types of antennas have different characteristics. For example, dipole antennas are simple to construct, can be easily adjusted for resonance at the desired operating frequency, and have a bidirectional radiation pattern. Monopole antennas, on the other hand, are omnidirectional, require less space than dipoles, and are often used for mobile and portable communications.

Construction

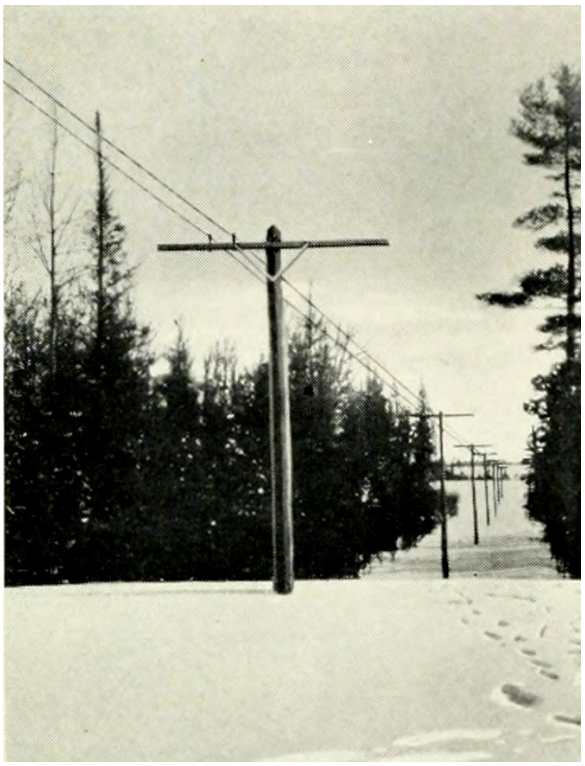
A Beverage antenna consists of a horizontal wire from one-half to several wavelengths long (tens to hundreds of meters; yards at HF to several kilometers; miles for longwave) suspended above the ground. The wire is usually installed parallel to the ground, with a height of approximately 0.1 to 0.2 wavelengths. The feedline to the receiver is attached to one end, and the other end of the wire is terminated through a resistor to ground. This configuration helps to minimize ground losses and achieve better directivity.

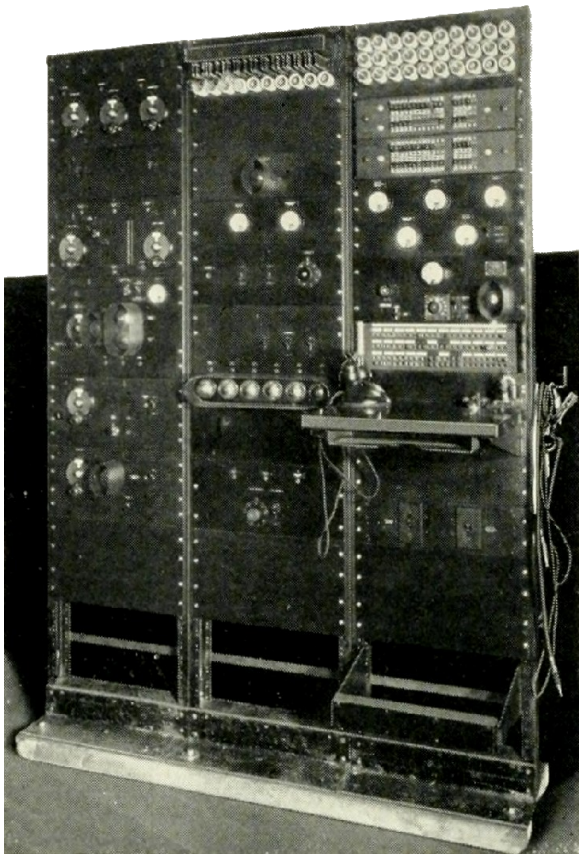
Use

The Beverage antenna is now used by amateur radio operators, shortwave listeners, longwave radio DXers, and for military applications. It is especially effective for receiving low-frequency signals and is highly regarded for its simplicity, low noise reception, and ability to capture signals from great distances. The antenna has a unidirectional radiation pattern with the main lobe of the pattern at a shallow angle into the sky off the resistor-terminated end, making it ideal for reception of long-distance skywave (skip) transmissions from stations over the horizon which reflect off the ionosphere.

The Beverage antenna has stood the test of time, remaining a popular choice for radio enthusiasts and professionals alike. Its unique design and capabilities make it an invaluable tool in the world of long-wave radio communications. Despite its physical size and inability to rotate, its excellent directivity, wide bandwidth, and strong ability to receive distant and overseas transmitters make it a worthwhile investment for those in need of a reliable long-wave antenna.

~





The AT&T receiving Beverage antenna (top) and radio receiver (bottom) at Houlton, Maine, used for transatlantic telephone calls, from a 1920s magazine

A Linked End-Fed Half Wave Antenna System

…or what happens when a Ham buys a 3D printer

by DMITRY SEVOSTIYANOV VA7DVO

Dmitry Sevostiyanov VA7DVO

Dmitry is a 2022 graduate of our SARC Basic course. He now also has his Advanced certification and is an active member of SARC.

I have a passion for portable operation, and engaging in Parks on the Air (POTA) has become my favorite pastime. I thoroughly enjoy being outdoors, and through my pursuit of numerous POTA parks, I've had the pleasure of discovering many breathtaking and picturesque locations.

When assembling my portable kit, weight was a significant consideration for me. I aimed for a kit that could conveniently fit into a backpack. Thus, selecting a lightweight and portable antenna was crucial. After researching the equipment used by other POTA activators, I decided to experiment with an End-Fed Half Wave antenna. This antenna is elegantly simple; essentially a long piece of wire with a 49:1 or 64:1 impedance transformer. Its deployment in the field is straightforward, requiring only a single high point.

With its feed point near the ground, setup is simplified, and my footprint in the park is minimal. Additionally, the antenna is resonant on multiple bands, eliminating the need for a tuner. The antenna requires either no ground system or a minimal one, with the coax feed itself serving as a counterpoise. The antenna's resonance across multiple bands that greatly enhances its versatility.

Armed with this knowledge, I embarked on building my first EFHW antenna. Numerous instructions are available online, with one of the most detailed provided by HF Kits at https://www.hfkits.com/build-instruction-impedance-transformer-250w-for-end-fed-antennas/.

Image 1 *[next page]*: My first home-made EFHW antenna with 49:1 transformer, the traditional transformer winding pattern

During POTA activations, I primarily operate on 20 meters, so my initial antenna consisted of a 10-meter-long wire. It performed great, and I made many successful contacts. The wire length proved to be ideal for my requirements. However, I also wanted to operate on 15 and 40 meters, which required a 20-meter-long wire. Upon adding the pre-tuned 20-meter wire, I encountered some challenges. Managing the longer wire became more cumbersome, occupying additional space within the park. Additionally,

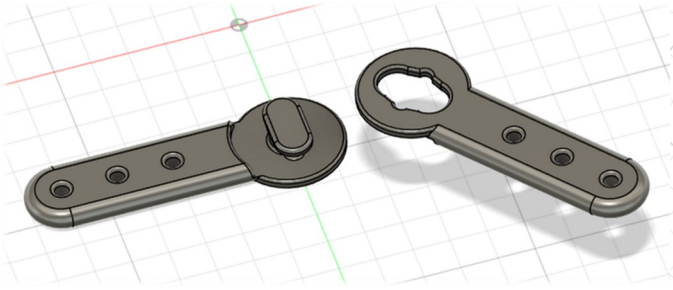
the lengthy wire frequently became entangled in nearby branches. It was evident that a better solution was required.

The solution, as it turned out, was quite straightforward – utilizing a 7.5-meter piece of wire for 15 meters and linking a shorter 2.5-meter wire when transitioning to 20 meters. This approach significantly improved manageability and minimized interference. The only remaining task was to figure out a simple and reliable system for connecting the wires together, which is precisely what this article aims to address.

I have a 3D printer at home, opening up virtually endless creative possibilities. It took a few prototypes to arrive at the final design of the antenna links. The links snap together with a satisfying click, providing a solid connection while also incorporating strain relief for the antenna wires. Additionally, the last link serves as a line insulator. Printing the links was quick, requiring only one part that needed print supports.

The ability to easily adjust the length of the antenna allowed me to create a resonant antenna for 10, 12, 15, 17, and 20 meters, all while keeping its length at about 10 meters. I have used SOTA antennas calculator to get initial wire length https://www.sota-antennas.com/efhw.php. NanoVNA was used to fine-tune antenna elements on different bands. The antenna wire is AWG16 primary wire from Amazon, this size offers the best combination of weight and power handling capability. It should be able to handle 100 Watts without issues.

Image 1: The traditional EFHW antenna with 49:1 transformer



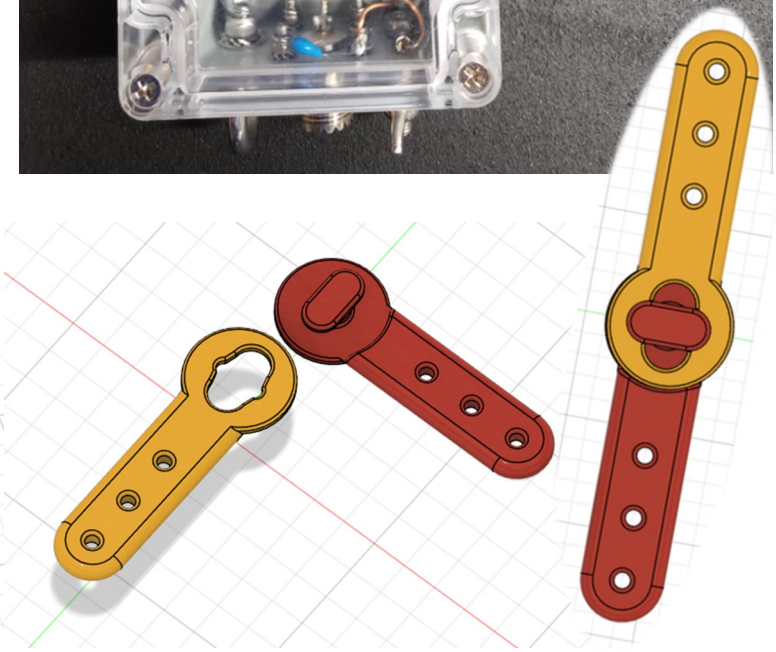
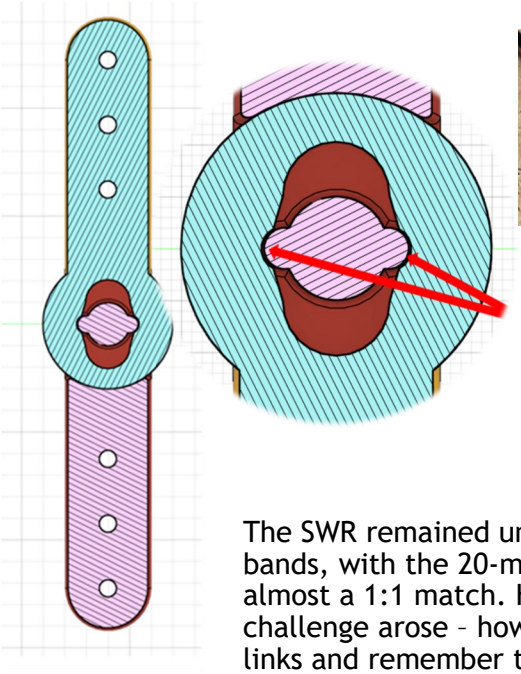


Image 2 [left]: Final design of interlocking antenna links and Image 3: The links lock together by overlapping them first, than twisting 90 degrees. Image 4: Links in the locked position



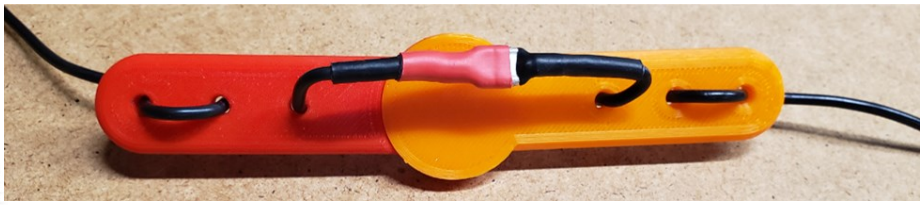


Image 5 [left]: Cross-section of the links, showing how they interlock

Image 6: Protruding knobs act as locking pins, preventing links from sliding apart.

Image 7 [right]: Once the links are locked, antenna wires are connected. I have used spade connectors, but automotive bullet connectors might be a better choice. Additional holes are used to provide wire strain relief

The SWR remained under 1.5:1 for all bands, with the 20-meter band achieving almost a 1:1 match. However, a new challenge arose – how could I identify the links and remember their order? Initially, I labeled the links, but then I had an "Aha" moment. Why not use different colors? Over the years, I had accumulated a variety of 3D print filaments in all colors. Then, another "Aha" moment struck me – why not follow the colors of the rainbow? The sequence of colors is ingrained in my memory, making it effortless to remember how to add or remove the link to switch between bands. Thus, the antenna starts with a 6-meter wire for 12 meters (Red), followed by 15M band (Orange), 17M (Yellow), and 20M (Green).

Image 8: Linked antenna elements using links of different colours

That was a promising start. However, while operating POTA for a few hours, I noticed that the 49:1 transformer I had built was starting to warm up. Heat typically indicates power loss, prompting me to embark on a journey to enhance the efficiency of the transformer. During my research, I came across several valuable resources. Colin Summers, a Ham operator from Scotland (MM0OPX), shared insightful tests on various toroids and winding patterns on his YouTube channel:

https://www.youtube.com/watch?v=Xe0wvbOQeok

Colin's work was based on the research conducted by another YouTuber, Evil Lair Electronics. He even developed a PCB for mounting the toroid and capacitor. All the part numbers and assembly instructions are available on his GitHub page:

https://github.com/evil-lair/EFHW-antennas

Colin had provided a great tutorial on how to build the transformer:

https://www.youtube.com/watch?v=dgk0HtOuE0I

Image 9. Closely-spaced autotransformer design with tapped primary. Image courtesy of Dan Koellen AI6XG

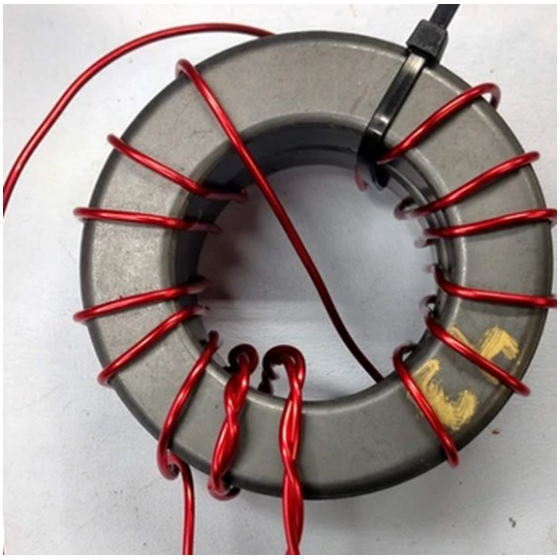


Image 10: For comparison, traditional 49:1 transformer design. Image courtesy of Dan Koellen AI6XG

The other YouTuber, SurvivalComms, made another tutorial on how to build the transformer, see https://www.youtube.com/watch?v=E54yPI76VA0

Based on the research, the most efficient design utilized a closely spaced winding patterns as well as an autotransformer with tapped primary, deviating from the twisted primary and cross-over winding of traditional designs. See the different winding patterns below. Dan Koellen AI6XG published great article comparing different windings, see https://www.ai6xg.com/post/all-wound-up-about-efhw-transformer-winding.

After procuring the necessary parts and PCB, I assembled a new transformer based on Evil Lair Electronics' design. The final transformer performed admirably, and I made my first POTA DX contact with Japan while operating FT8 on 20 meters – an exhilarating experience!

Although the heat issue was largely resolved, the transformer's bulky size remained a concern. Consequently, my next 3D design project focused on creating a better transformer box.

Image 11: Completed 64:1 transformer based on Evil Lair Electronics design, next to the PCB designed to hold the toroid and capacitor. Binding post with captive nut connects to the first antenna link.

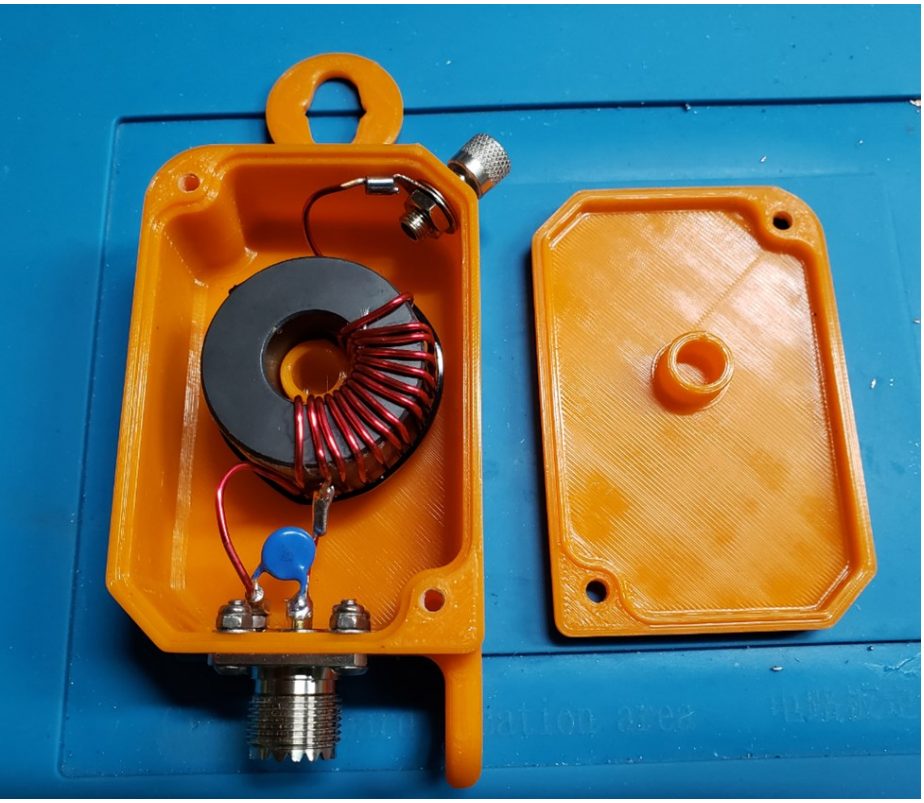


Image 12: The 3D printed 49:1 or 64:1 autotransformer enclosure; build around 39mm ferrite core, Fair-Rite part number 2643251002. Capacitor is 120 picofarad TDK CC45SL3FD121JYNNA

Image 13: 3D printed loading coil (end piece) with plastic tubing attached

After few prototypes, the design was finalized. The enclosure is just large enough to accommodate all the components. I have rounded all the corners to save on the filament and make it look as sleek as possible. The ferrite core is supported by the raised cylinder in the center of the enclosure. The enclosure is held together by two 8-32 x 1/2 inch long countersink stainless steel screws. I have incorporated the ring at the bottom of the enclosure as an attachment point for the rope, giving more flexibility on how the enclosure is suspended. The antenna wires would be attached using the same type of links. The antenna wire is connected to the transformer using binding post with captive nut. During the 3D slicing process, I ensured to add extra material to critical areas to enhance the enclosure's strength. It is also printed using bright orange filament for better visibility. The enclosure is small enough, so I can take two of them to the field, with 49:1 or 64:1 impedance matching. That gives me plenty of opportunities to tinker with different settings.

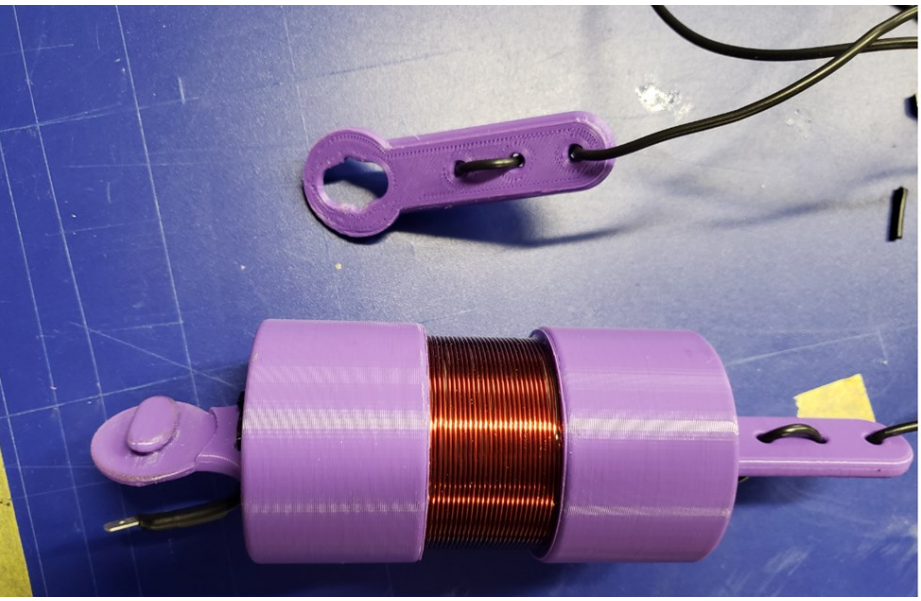


Image 14: 3D printed loading coil, incorporating link on one side and cable strain relief on the other.

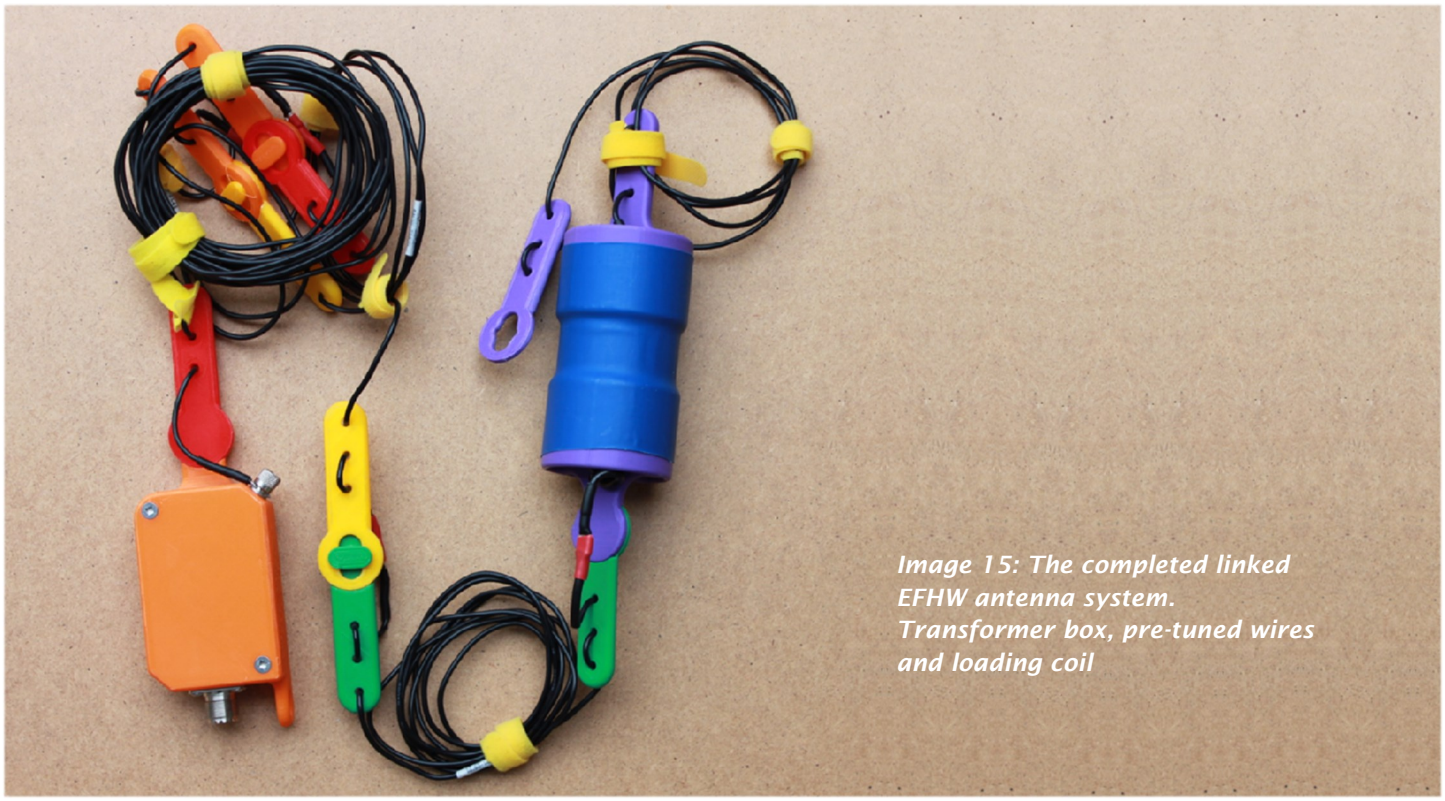


Image 15: The completed linked EFHW antenna system. Transformer box, pre-tuned wires and loading coil

Lastly, I aimed to incorporate a 35 uH loading coil into the antenna for the 40-meter band while maintaining a relatively short antenna wire, with total length of about 12 meters. As expected, my 3D printer was more than capable of fulfilling this requirement. I fashioned the coil around a 2-inch ABS tube typically employed for central vacuum systems. The 3D printed components were securely affixed to the tube using epoxy, while the magnet wire was encased within heat shrink tubing for added protection.

The number of winds was calculated using this online calculator.:

https://www.66pacific.com/calculators/coil-inductance-calculator.aspx

I tested the coil's inductance with my LC meter and ended up with 27 winds. Using the tested link design, I attached the coil to the antenna.

At this stage, I proudly consider the transformer enclosure, linked wire, and linked coil as an **Antenna System**.

My next addition to the antenna system was a 12-meter long fiberglass telescopic mast made by SpiderBeam. With the mast, my portable kit is no longer "backpackable", but it allows me to set up my station at any location without relying on nearby trees.

SpiderBeam is an excellent mast, but it doesn't come with guy rings. Once again, the 3D printer came to the rescue.

I incorporated a knob and stainless steel bolt from Home Depot to securely attach the ring over mast. The ring is wide to distribute the clamping load more evenly:

https://www.homedepot.ca/product/paulin-3-8-inch-5-point-star-knob-in-black-1-pc/1000143967

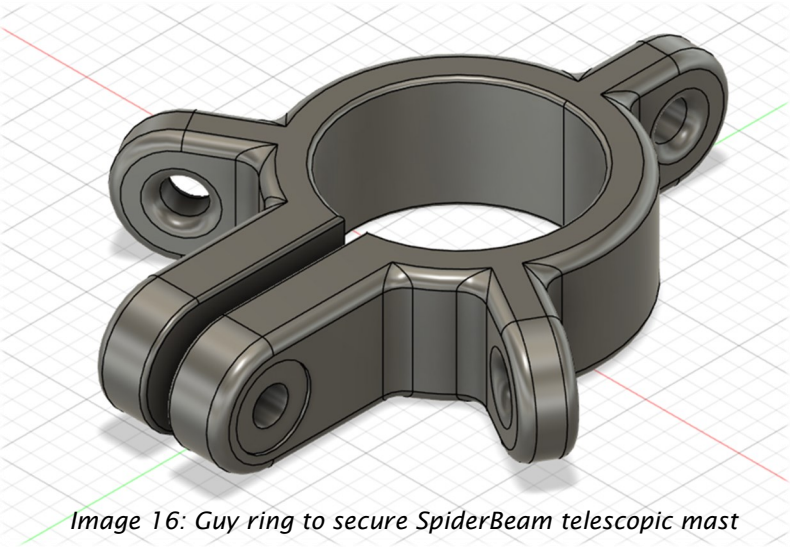


Image 16: Guy ring to secure SpiderBeam telescopic mast

I printed two guy rings, second set had smaller inside diameter to fit on the second section of the mast, but in most cases, just one set of guy ring and guy ropes is enough.

The guy ring fits perfectly and clamps very tightly. I added ratcheting tent tie-downs from AliExpress to easily adjust the tension of the guide ropes.

https://www.aliexpress.com/item/1005005427035268.html

I also used heavy-duty ground spikes from Amazon, spray-painted bright orange. https://www.amazon.ca/dp/B09SHKXD8K?psc=1&ref=ppx_yo2ov_dt_b_product_details

Finally, I designed the mast support cup and protective cover, incorporating an aluminum spike I purchased from AliExpress. https://www.aliexpress.com/item/1005002959724412.html

Image 17: 3D printed guy ring and clamp assembly with star knob and attached wires

The antenna system is now fully field-tested. It takes just minutes to deploy, and the 40-foot mast stays very secure. During my recent activation in park CA-3245, Boundary Bay Wildlife Management Area, I made 177 contacts running 60W SSB, including Japan, Madeira Island, and Puerto Rico stations. The antenna performed admirably, and SWR was under 1.2:1 on 20 meters.

The antenna performed well even in the most challenging conditions. When activating park CA-0445, Cultus Lake Provincial Park, I was located in the valley between two mountains. Yet, I still managed to make contact with one Swedish and two Italian stations, all while running 70W SSB.

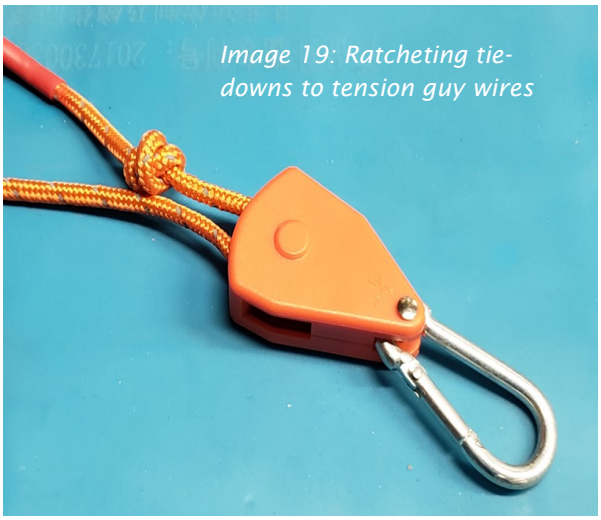


Image 19: Ratcheting tie-downs to tension guy wires

Image 18: The guy ring is clamped to the mast.

This concludes my EFHW build experience, at least for now. Next, I will be building a linked dipole, but that's a story for another time. All 3D printed designs are available on ThingiVerse, https://www.thingiverse.com/thing:6570844

73,

~ Dmitry VA7DVO

Continued next page

Image 20: SpiderBeam mast support cup with the protective cover

Image 21: Mast support cup is driven into the ground. The mast stays upright while I'm installing guy wires

Image 22: Field deployment, activating park CA-3245, Boundary Bay Wildlife Management Area

Image 23. Activating park CA-0445, Cultus Lake Provincial Park

References

EFHW Antenna Presentation

http://www.gnarc.org/wp-content/uploads/The-End-Fed-Half-Wave-Antenna.pdf

Best Ferrite Core For a 100w End Fed Half Wave Antenna

https://www.youtube.com/watch?v=Xe0wvbOQeok

An efficient 40-10m EFHW antenna for portable ops

https://www.youtube.com/watch?v=0s1kfxzLVXc

How to wind an End Fed Half Wave Autotransformer

https://www.youtube.com/watch?v=dgk0HtOuE0I

All Wound Up About EFHW Transformer Winding

https://www.ai6xg.com/post/all-wound-up-about-efhw-transformer-winding

Another small efficient matching transformer for an EFHW – 2643251002

https://owenduffy.net/blog/?p=21901

Toroid windings for EFHW

https://reflector.sota.org.uk/t/toroid-windings-for-efhw/30081

Performance of 49:1 Ferrite Core Transformers

https://squashpractice.com/2021/06/23/performance-of-491-ferrite-core-transformers/

Wire length calculator for different types of antennas, including EFHW

https://www.sota-antennas.com/efhw.php

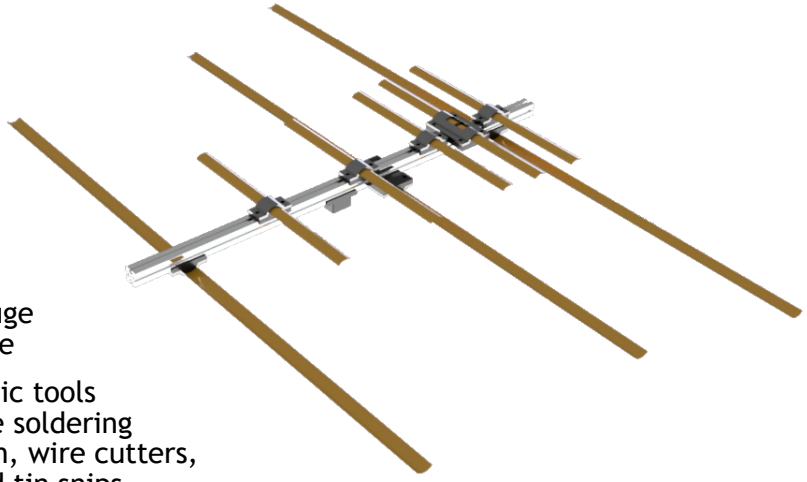
EFHW Antenna Length calculator

https://k7mem.com/Ant_Element_Lengths.html

Sota Linked Dipole calculator
https://www.sota-antennas.com/linkd.php

A Satellite Antenna Project

Creating a DIY tape measure dual-band Yagi antenna for amateur radio



The Yagi, a directional gain antenna where radio waves are focussed in one direction, is a staple in amateur radio operations. We present one here that is relatively simple to build—even more so if you have access to a 3D printer.

Its design allows for efficient communication over the 2 meter and 70 cm bands, which are popular among ham radio enthusiasts for their ability to reach satellites and distant repeaters.

Materials and Tools

To construct a tape measure Yagi antenna, you'll need:

- A 3D printer
- A ham radio and license
- An SWR meter
- A 20x20x1000mm extrusion
- M5 hardware and T-nuts
- A steel tape measure
- Coaxial cable
- Heat set inserts
- 22 gauge wire
- Basic tools like soldering iron, wire cutters, and tin snips

Design and Dimensions

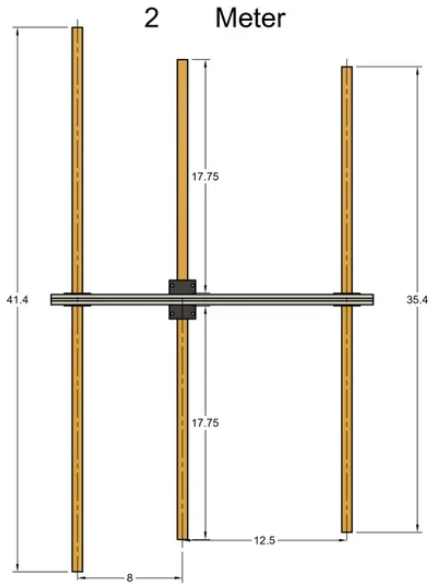
The antenna's design is optimized for satellite operation at 145 MHz on the 2 meter side and 437 MHz on the 70 cm side. The dimensions can be adjusted according to individual needs, but the project at Instructables provides a solid foundation for those looking to build their own.

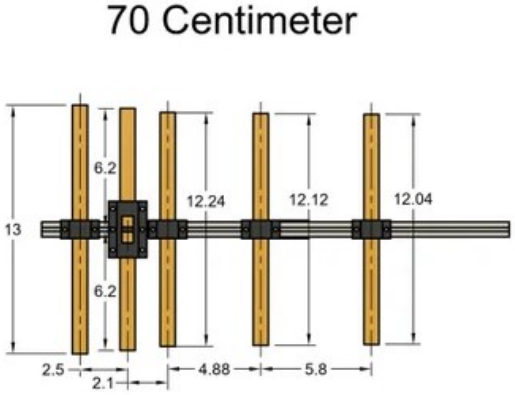
Construction Steps

The entire project is explained very well in the Instructables article and the accompanying YouTube video.

1. Cutting Extrusion: Trim the extrusion to the desired length for a more compact antenna.
2. Cutting Elements: Cut the tape measure into elements based on

relatively simple to build—even more so if you have access to a 3D printer





the chosen dimensions, taking care to smooth any sharp edges.

3. Printing Parts: 3D print the necessary brackets and clamps, ensuring they are sanded smooth for assembly.
4. Assembly: Begin by placing the reflector elements and proceed to assemble the antenna, maintaining precise spacing between elements for optimal performance.

Safety and Tips

- Handle cut tape measure edges with care to avoid injury.
- Use electrical tape on element brackets for a secure grip.
- Ensure all parts are cooled down after soldering before handling.

Whether you 3D print the parts or use your own ingenuity, building a tape measure Yagi antenna is a rewarding project for any ham radio enthusiast. This one combines the precision of modern 3D printing with the satisfaction of DIY craftsmanship, resulting in a functional and portable antenna for various applications. The detailed guide on Instructables offers a step-by-step approach to constructing this useful tool for amateur radio communications.

~ Original project by Mikiah Groff

Watch the project video on YouTube

A 145 MHz Rectangular Loop

An easy and very effective DIY antenna project

by ANDREW MOSELY VK1AD

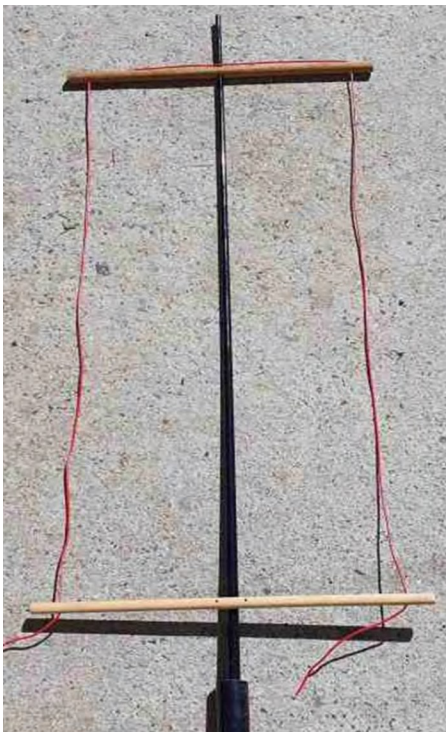
Peter, VK3YE recently published a 2 m rectangular loop antenna article in Amateur Radio Magazine, edition 5 (Sep/Oct 2019). The feed point impedance of the 2m rectangular loop is 50 ohms thus avoiding the need for a ¼-wave impedance transformer.

I have constructed the lightweight 150 -gram antenna and plan to use it for portable SOTA operations in the lower narrow band segment of the VK (Australian) 2m band, SSB, CW and digital modes. I chose a centre frequency of 145 MHz which permits operation on 144.2 MHz SSB or 146.5 FM simplex. In this configuration polarisation is horizontal. (Note that IARU Region 3 (North America) has 144 to 148 MHz for 2 metres, Region 1 (Europe) has 144 to 146 MHz. Ed.)

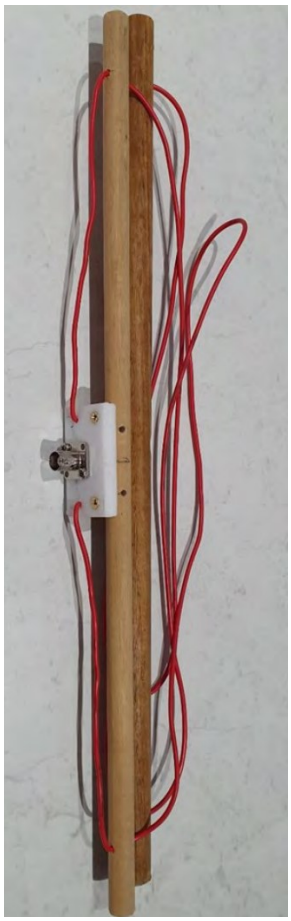
2m antenna dimensions: Oblong 360 mm wide x 690 mm high, 1/6 of a wavelength wide and 1/3 of a wavelength tall. The oblong ratio is 1/3 across and 2/3 high.

My finished antenna wire length is 2.130 metres, which includes an extra 15 mm on each side for feed point strain relief. The finished length will depend on the wire diameter used. Start with a longer length and trim for a low VSWR.

Full wave loop formula: 306.3/frequency (metres) or 1005/frequency (feet)



Finished 2 m 145 MHz rectangular loop antenna 360 mm x 690 mm



Combined weight is 150 grams

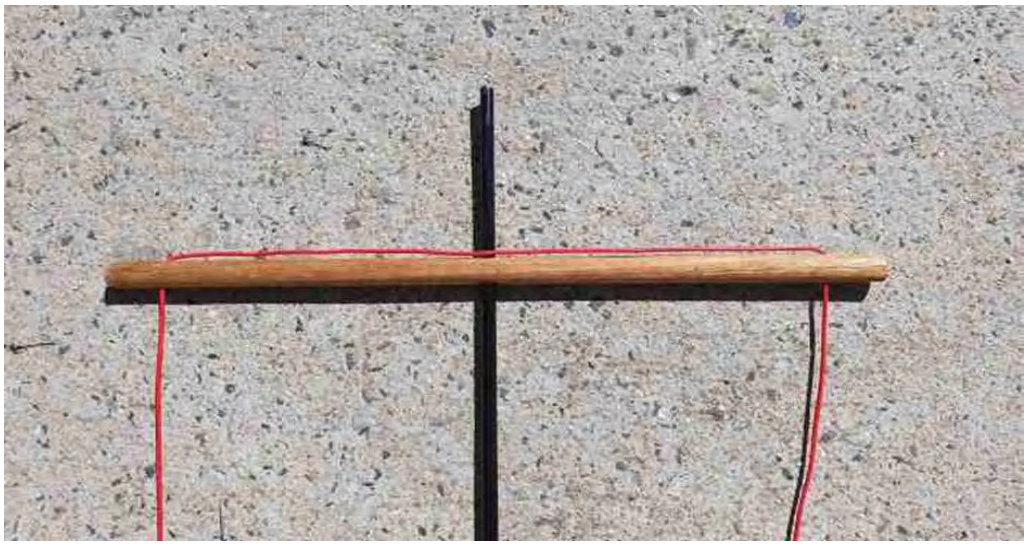
Materials

- 420 mm length of 16 mm dowel (top arm).
- 420 mm length of 12 mm dowel (bottom arm).
- 2.2 metre length of insulated 18 AWG multi-strand copper wire.
- BNC panel mount.
- 2 x M3 screws, washers and nuts.
- 1 x solder tab.
- 2 x M3, 18 mm brass screws.
- 1 50 mm x 30 mm section of kitchen cutting board.
- Telescopic fibreglass pole, avoid using a carbon fibre pole.

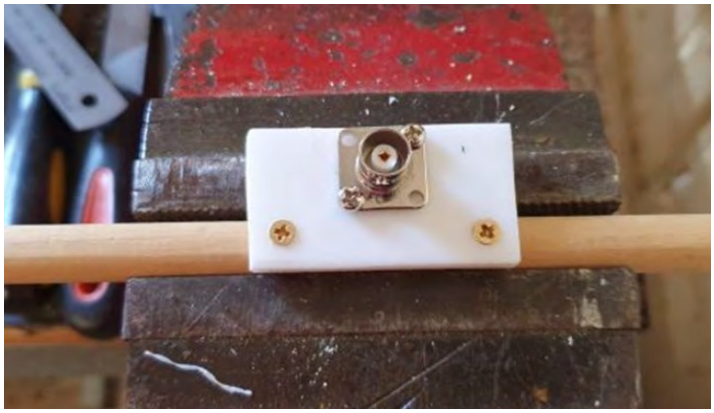
RF Choke

If required wind 9 turns of RG58AU coax around a 25 mm former. Make a 1 turn loop near the feed point for strain relief on the coax BNC plug.

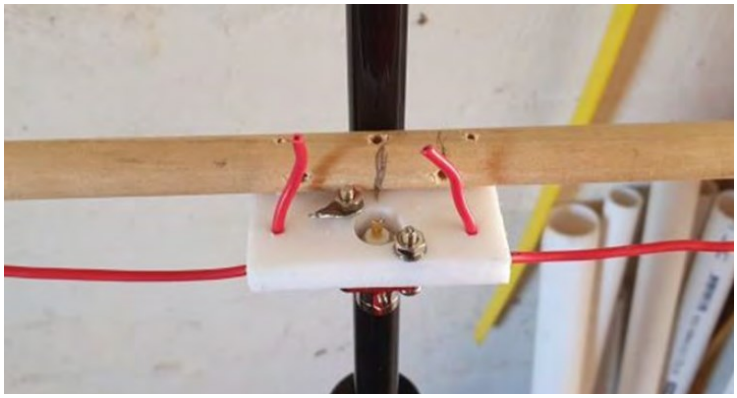
(Thanks to Peter VK3YE for publishing his article in AR Magazine, Edition 5 (Sep/Oct 2019). Peter's YouTube video can be found at: https://youtu.be/Nyttl277ehs?feature=shared.



16 mm dowel top cross-arm transfers the weight of the antenna to the telescopic pole.

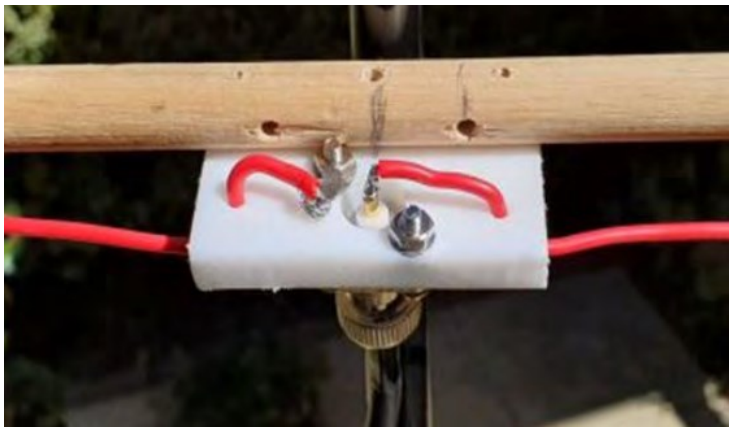


BNC panel mount, mounted to a section of kitchen cutting board. The nylon board is mounted to the centre of the bottom dowel crossarm.



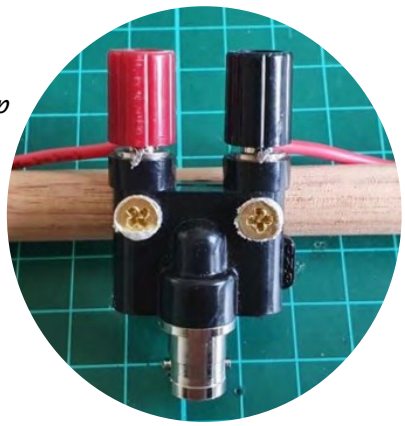
50-ohm feed point – antenna wire is passed through 2,5 mm holes for strain relief. Solder one side of the loop to the BNC centre pin and the opposite side to the body solder tab.

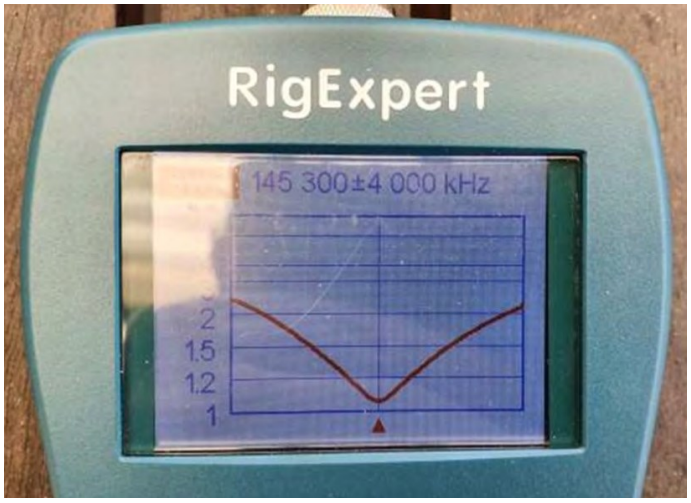
Using the 2 m oblong loop antenna from Honeysuckle Mountain, VK1/AC-027



Bottom cross-arm feed point. To secure the feed point to the pole, pass a short length string through the dowel and around the pole and tie off. Connect a length of RG58AU Mil Spec coax to the BNC socket.

Replacement 2m Oblong Loop feed point, BNC Banana adapter mounted to the 12 mm bottom dowel.



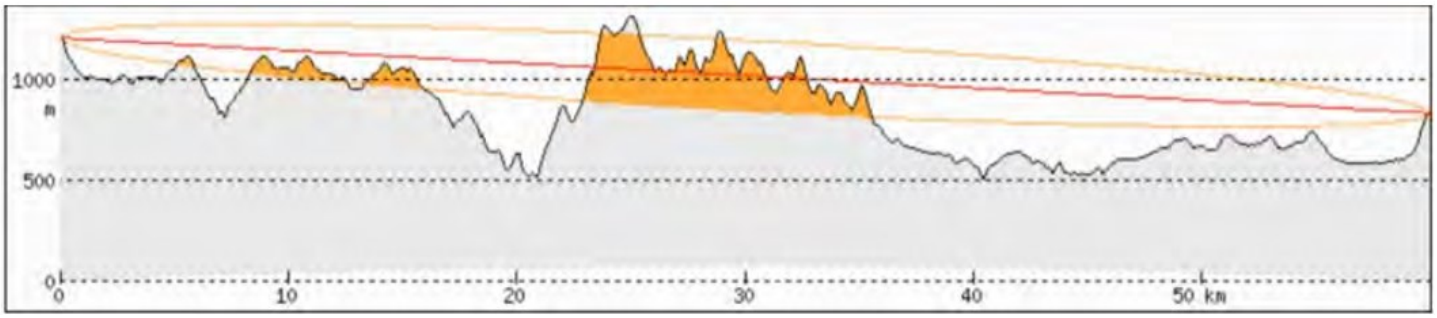


RigExpert AA600 VSWR scan – 141 to 149 MHz

Update 30 June 2020

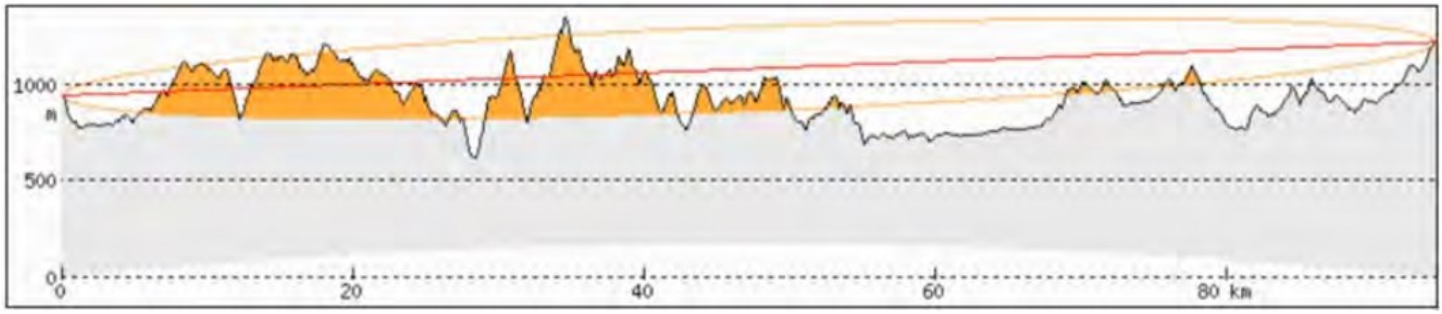
Summit to Summit QSO from Tumorrama Hill, VK2/SW-036, 941m ASL to Mt Foxlow, VK2/ST-010 1219m ASL. On Sunday 28 June 2020 using this antenna on a 6m telescopic pole I made a S2S contact with VK1HAB on 146,500 MHz FM at 5 watts over a 94 km path of difficult terrain. Remember horizontal polarisation has less RF attenuation than vertical polarisation at the same output power level.

This antenna is not a 3 element Yagi, it is a single oblong loop 360 mm x 690 mm fed at the bottom for a 50-ohm impedance match. There is no requirement for a 75- ohm ¼-wave impedance transformer.



Mt Tumorrama to Mt Ainslie RF path and Fresnel zone at 144 MHz courtesy of Hey Whats That Path Profiler.

VSWR scan
141 to 149 MHz



Tumorrama Hill to Mt Foxlow RF path and Fresnel zone at 146 MHz courtesy of 'Hey Whats That Path Profiler.'

Summit to Summit QSO from Mount Tumorrama, VK2/SW-027 with Al Long, VK1RX at Mt Ainsle, VK1/AC-040 on 144,200 MHz SSB at 5 watts over a 60 km.

Update 11 October 2020

I have changed the feed point to a BNC Banana adapter. Antenna weight is now 70 grams.

Acknowledgements

Hey What's That Path Profiler http://www.heywhatsthat.com/profiler.html

~ Andrew Moseley, VK1AD

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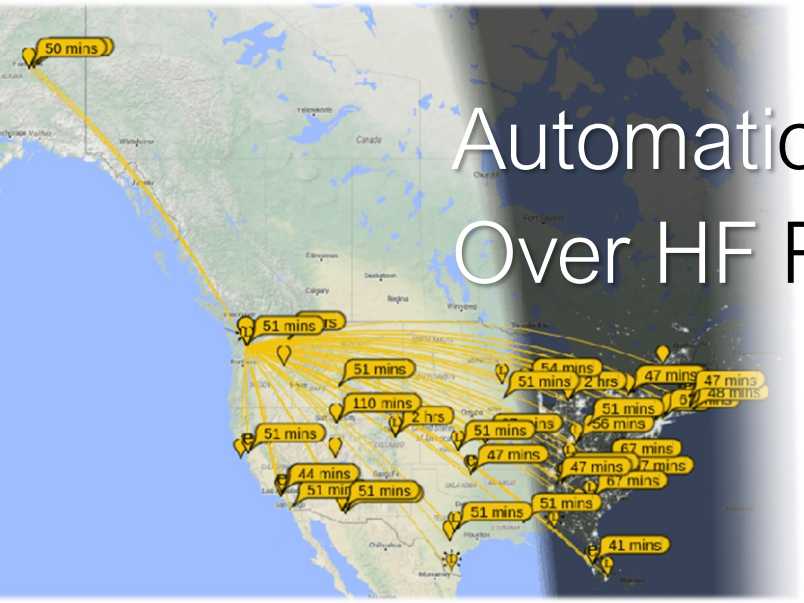
This article also appeared in Radio ZS, April 2024. Volume 77, Issue 4 Page 23.

The 2 m oblong loop at ivingstone Hill,VK2/SM-093

The setup at Mount Tumorrama, VK2/SW-027

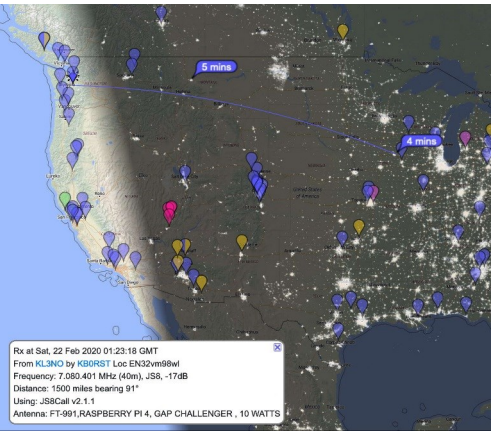


Automatic Position Reporting Over HF Radio

by BRYAN COCKFIELD—HACKADAY

While most of us carry cell phones that have GPS and other location services, they require a significant amount of infrastructure to be useful. Drive from Washington to Alaska like [Lonney] did a while back, where that infrastructure is essentially nonexistent, and you'll need to come up with some other solutions to let friends and family know where you are.

A tool called the Automatic Packet Reporting System (APRS) is fairly robust in the very high frequency (VHF) part of the amateur radio spectrum, but this solution still relies on a not-insignificant amount of infrastructure for the limited distances involved with VHF. [Lonney] adapted a few other tools to get APRS up and running in the HF range, letting his friends keep tabs on him even from the most remote locations.



The build relies on a second piece of software called JS8Call which is a text-based mode that allows radio operators to communicate "keyboard to keyboard". It has a number of interesting features beyond this basic functionality though, including message forwarding. The software in [Lonney]'s build allows a small computer equipped with a GPS receiver to gather its location information, compose a brief message in JS8Call, and then send it to the APRS network in the high frequency (HF) portion of the spectrum which supports much further communications distances than VHF generally allows.

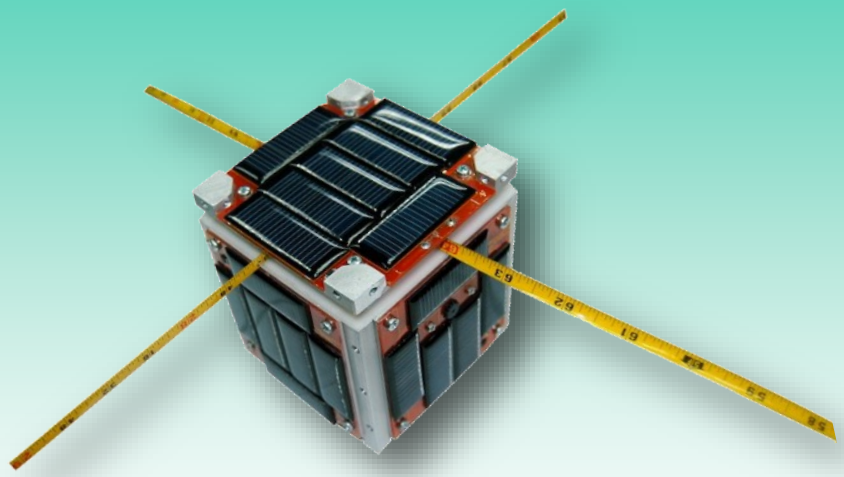
The build goes a little beyond the functionality of widely-available radio software, though. He's also written scripts that automate a lot of the tricky parts of dealing with a car and getting radios set up in one for a road trip, including automatic startup and shutdown. Originally this was built with a Raspberry Pi but he's since switched to a laptop. He's also done some testing on various bands and found the 40-meter band to be the best compromise between activity and range, with more than enough of each to make the long trip again.

For those unfamiliar with JS8Call, we've touched on it briefly with a few builds like this digital HF SDR transceiver which supports the protocol, but the short story is that it's built on another tool called FT8 which was originally designed for quick contacts using weak signals. JS8Call essentially expands the functionality of this fairly revolutionary method of radio operation.

~ Bryan Cockfield—HACKADAY

The original story can be found at: https://hackaday.com/2024/03/27/automatic-position-reporting-over-hf-radio/

Satellites



Decoding signals from a geostationary weather satellite

by PETER VOGEL VE7AFV

Using relatively simple equipment, Peter Vogel now decodes signals from weather satellite GOES-18.

Over the years in this column I've discussed some of my passions in dealing with radio signals (talking to astronauts aboard the ISS, tracking aircraft, decoding signals from near-earth weather satellites are among some of the topics I've covered).

However, for several years now I've wanted to tackle the decoding of signals from a geostationary weather satellite. This is an order of magnitude more complex because the satellites involved are far from Earth, at an altitude of almost 36,000 km above the equator.

Such geostationary satellites appear fixed with respect to an observer on Earth because at this great altitude their orbital period matches the rotational period of our planet. And therein lies both a challenge and an opportunity for a hobbyist such as me. Because the satellite appears fixed in place, it should be possible to aim a suitable antenna in its direction and perhaps receive, and decode, signals from it.

Indeed, this is possible, more or less as I've described it. And a Canadian-American company, NooElec, has taken some of the complexity involved and simplified it quite dramatically. Their simplification is on the hardware side, packaging a dish antenna and receiver mount in three parts, and coupling these with

Peter Vogel VE7AFV actively monitors weather and other satellites from his home in Port Coquitlam, BC. Follow Peter on Facebook (facebook.com/PeterVogelCA), or on Twitter (@PeterVogel) pvogel@outlook.com

two parts for which NooElec was already well known, a small software defined radio (SDR), and an equally small low noise amplifier (LNA).

Putting the physical components together was completely straightforward. More challenging was the data processing required to turn radio signals from the satellite, as received by the dish, amplified by the LNA, and tuned by the SDR, into images.

Here in western North America, the geostationary satellite of choice is named GOES-18, Geostationary Operational Environmental Satellite number 18, operated by the National Oceanic and Atmospheric Administration (NOAA). 18 is part of a group of four GOES satellites known collectively as GOES-R. This group has a collective price tag of almost $12 billion.

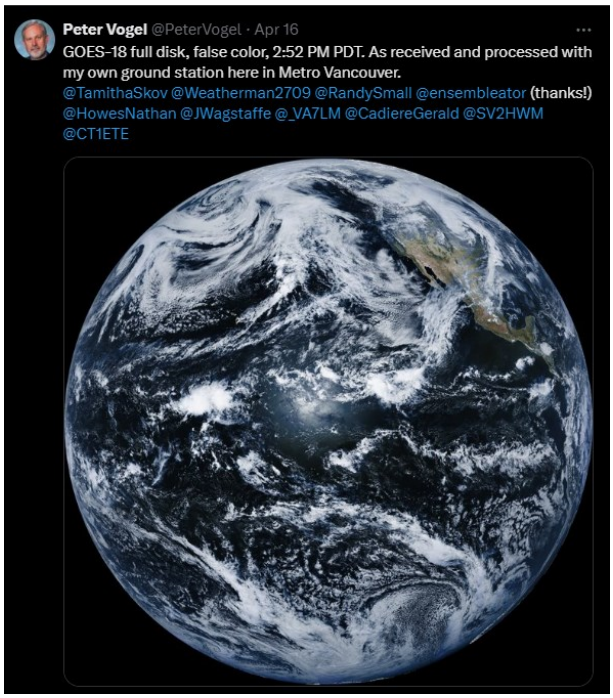
GOES-18 has particular strengths in four areas: atmospheric weather, environmental hazard monitoring, ocean observations, and space weather. GOES-R program director Pam Sullivan summarized the capabilities of the three existing, and one to come, satellites: “NOAA’s geostationary satellites provide the only continuous coverage of weather and hazardous environmental conditions in the Western Hemisphere, protecting the lives and properties of the 1 billion people who live and work there.”

Fast forward about a year. I had all the components assembled, but had put off tackling the software installation needed to bring everything together. This past weekend I did just that. I already had a small Raspberry Pi computer to handle the task. An enthusiast in Holland had put together a set of applications, named GOEStools, in the Linux environment for just this satellite group. Other enthusiasts had improved on this over time, chief among them weather satellite enthusiast Carl Reinemann in Wisconsin.

After installing an operating system on the Pi computer I proceeded to install the GOEStools software, carefully following the steps set out by my fellow aficionado in Wisconsin, more generally known by his Twitter name, USRadioGuy. After about an hour I was ready to begin the actual process of testing the entire assembly.

Part of the reason for my year-long trepidation was a concern that I might not be able to aim at the satellite, that it might be just out of reach behind a neighbour’s house. Using a site called DishPointer I was able to select GOES-18 as the satellite I was interested in, enter my exact location, and see a line plotted on a visual representation of my neighbourhood. Phew, just enough clearance as it turned out.

With sighting not being an issue it was time to get a signal. I activated the Pi computer, and the software component to test for signal strength. I had one problem: no screen on the Raspberry Pi. The solution was a phone application to connect to the Pi by its local address, then run the application while looking at the phone.



With RaspController showing the signal "quality" as processed on the Pi computer I began nudging the antenna rack a centimetre at a time. Once the error rate, known as a viterbi value, began dropping, I knew I was generally in the right direction. Once I had a low point, under 400, I took on the vertical angle. That required a small wrench. Slightly up, slightly down. Eventually that too had the viterbi value drop. With subsequent small adjustments I managed to get below 100.

Time to see if there was actual data. I issued the data collection command and sat back. About half an hour later I saw the first "writing" statement and shortly after that I was able to see the first image from a geostationary satellite as processed with my own ground station.

It was an exhilarating moment and I immediately posted it to X/Twitter: "First light! Signal that is. GOES-16 shot delivered via GOES-18. First image from my @Nooelec dish setup with SMArTee XTR tuner and software on a Raspberry Pi." The tweet quickly drew several thousand views.

However, within the tweet I was disguising some disappointment. The image was from GOES-16. I was aiming at 18, also known as GOES-west. The software I was using was geared to users in eastern North America. Adaptation was needed to have the software directly process the images from 18. This took several additional steps and the assistance of USradioguy.

As I write, my GOES-18 station is working beautifully, serving up dozens of stunning images every day. The signal also delivers relayed content from GOES-east, Japanese meteorological satellite himawari, and weather maps from the American National Weather Service.

Amazing indeed to be able to pull in and decode signals from a billion-dollar satellite with inexpensive equipment costing no more than a few hundred dollars.

~ Peter VE7AFV

Follow me on Facebook (facebook.com/PeterVogelCA), or on Twitter (@PeterVogel)

pvogel@outlook.com

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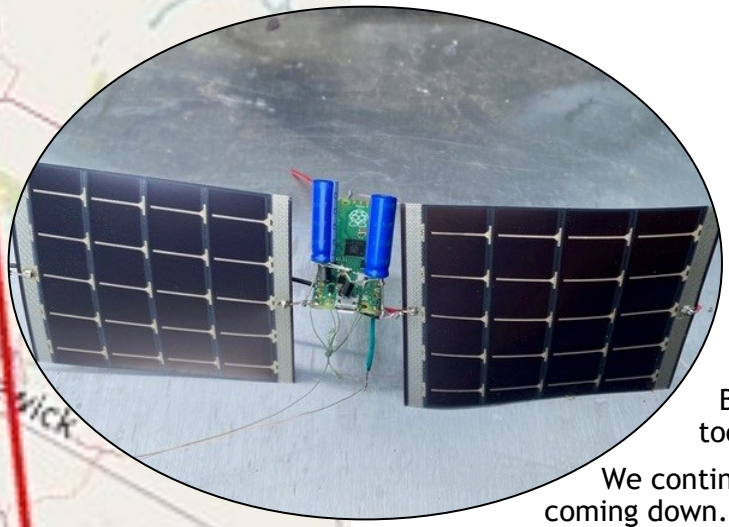
Tech

Another launch

Post flight summary

by ADRIAN STIMPSON VE7NZ



If I were Elon Musk I would declare this mission a success! But alas the late launch meant we lost the signal as the sun moved lower on the horizon and by the time we heard from the tracker this morning it was confirmed on the ground near Boise, Idaho. The search area is is too large to find it.

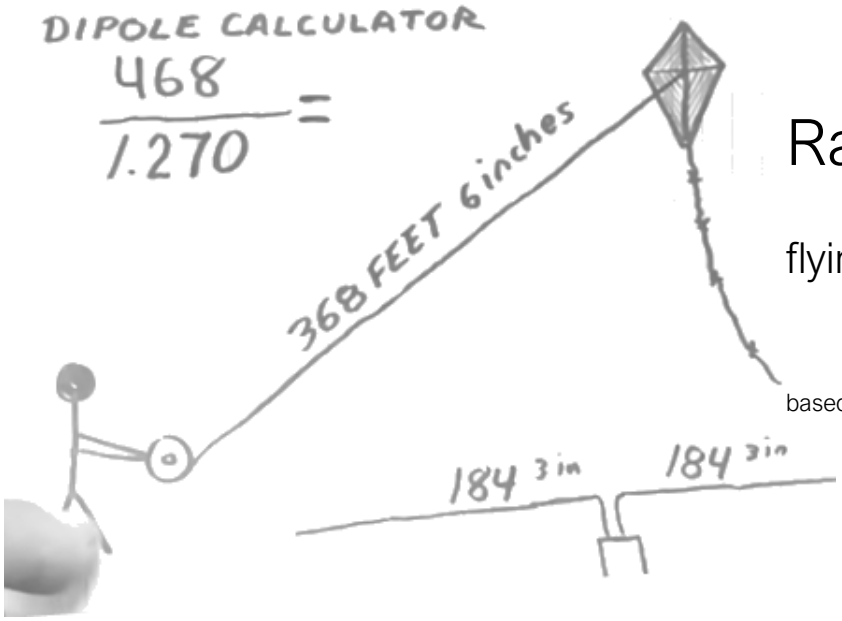
We continue to work on this. Costs are coming down. When we started and were self-funding this, the launch of a pico was costing around $350. We are now doing it for less than $100 (Canadian). Thanks to everyone for your support on the crowd funding page. We are only taking money from it for actual launches and paying for any experimental work on the bench ourselves.

In May we can launch another one with better success. At the end of April we will be testing new radios and image systems for the next high altitude launch planned for sometime this summer.

Thanks for your interest.

From the launch team VA7SL, VE7SLZ, & VE7TGX.

~ 73, Adrian VE7NZ



Radio Frequency Burns

flying a kite, and you

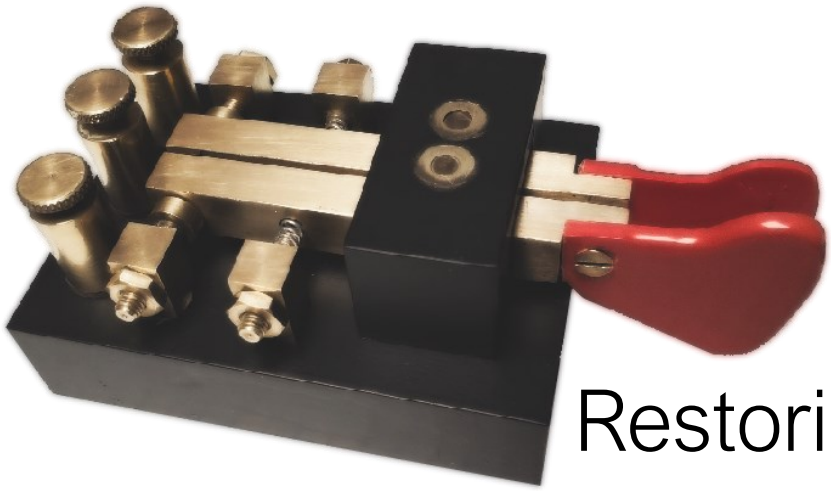
based on a story by LEWIN DAY—HACKADAY

In the realm of amateur radio enthusiasts, commonly known as 'hams', there exists a well-known hazard: the RF burn. This painful experience can occur when one inadvertently touches an antenna during its transmission phase. However, a recent video from Grants Pass TV Repair highlights that dangers also lurk on the receiving end. The video showcases an experiment where a kite antenna, resonating with a local AM broadcaster's signal, causes visible RF burns that emit smoke upon contact. The antenna, measuring 368 feet and 6 inches, was designed to be resonant at 1.270 MHz, matching the KAJO Radio signal. By flying the kite, the antenna extended into the sky, capturing significant energy from the broadcast tower, enough to cause a noticeable RF burn to anyone touching its end.

The experiment serves as a cautionary tale, illustrating not only the risk of RF burns but also the potential for more severe accidents. Kites can become entangled in power lines or even attract lightning strikes, both scenarios posing far greater threats than an RF burn. The video underscores the importance of exercising caution, especially when engaging in potentially hazardous activities. It is a stark reminder that AM radio towers, with their substantial power output, are not to be underestimated. The experiment, while demonstrating a scientific point, also reinforces the need for safety awareness in all radio-related endeavours.

~ The original HACKADAY article

Click to watch on YouTube



Restoring an Old Key

A Hamcation find turned into a jewel

by MICHAEL KASSAY VE3MKX

Mike Kassay VE3MKX has been a Ham since 1991. Very active in all facets of Ham Radio and is always experimenting with antennas and CW-QRP gear.

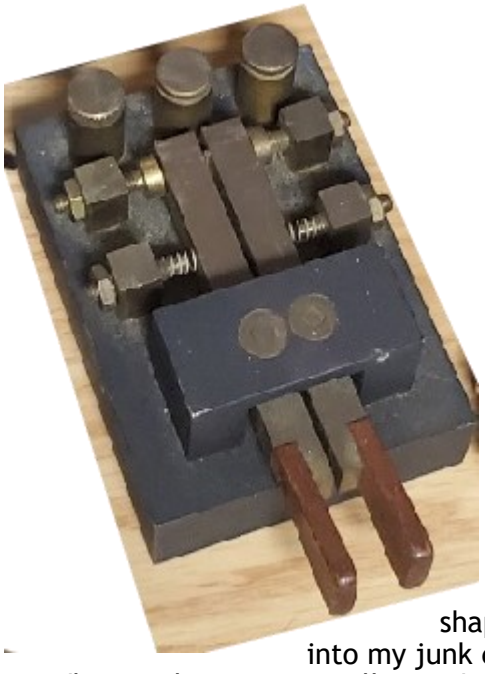
While at Hamcation (a great event) this year, I picked up this little Gem. It was found at one of the club tables located inside the Swaps building.

When I saw it, I said, 'wow it was way cool' .. It didn't have any markings on it and the seller said he thinks it was home made. The hamfest bartering fun then began. He wanted $40 for it and me, being the cheaper than usual Ham, I said 'How much do you want for this $30 dirty old key ' ?? He laughed but did not budge on the price. Being from the North I calculated the price with the 35% currency exchange rate. So I started to hem and haw... it was one of those... Do I buy it or not. I'd kick myself after if I didn't!!

I bought it! I'm glad I did!

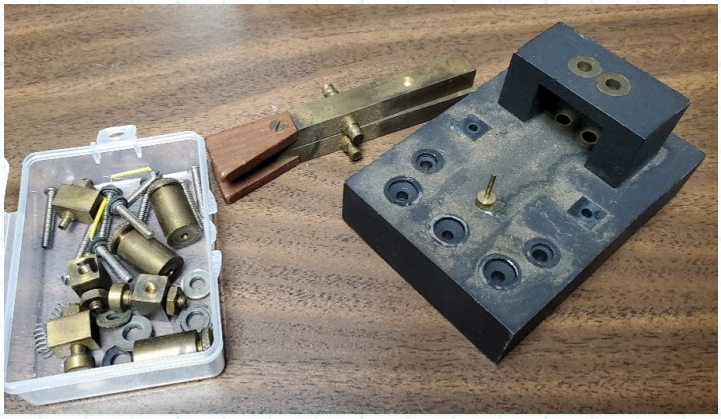
After my southern vacation I placed it on the bench, for the restoration that was about to begin. I took apart the key taking various pictures along the way so I wouldn't have anything placed in the wrong spot or left over. Even something as simple as fastener lengths could make a difference placed in different spots. I got out the Brasso cleaner, fibre cloth, Q tips, and rubber gloves. In hindsight it might have worked better cleaning with a toothbrush.

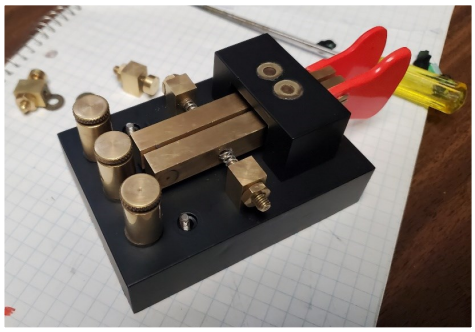
I'll save that idea for next time! Once the key was totally dismantled, I inspected all the parts. The black base was too far gone with scratches and chips to restore to my liking. So I then took some 220 grit sandpaper and gave the base the once over. I went over to the local Walmart and picked up some flat black Rustoleum spray paint. I was expecting a true flat dull black finish. What I finished with was like a flat egg shell black which to my surprise I like a lot better! After each coat of paint (let it dry for 24 hrs) I then did a quick sanding



with 220 grit water paper. So after three coats of paint it was done!

The key came with very small wooden finger paddles. I wasnt a fan of those because of the size and shape. So I went into my junk drawer, sorry my 'ham radio treasure collection' and found a pair of spare Begali finger paddles. These finger paddles were acquired a few years back at Dayton, another fantastic dont miss event! With a little cutting I made these fit onto the cleaned brass arms of the new key!



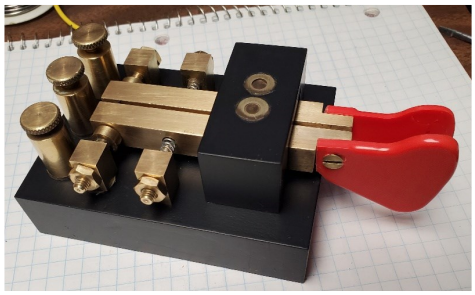


The key was then reassembled. One thing that I did do while reassembling was to wear gloves, so I wouldn't leave fingerprints all over the freshly restored key! I also gave the swivel arms a few drops of WD-40 which would prevent any sticking! The reassembly went fine. The overall project took a few days to complete. I did place a small piece of cupboard lining rubber under the base of the key to prevent the key from moving on the desk when in use.

The key weighs about 5lbs, so It didn't move much to begin with, but ya never know!! Overall the key has a very nice feel to it, I still have some tweaking to do to get the paddle to my liking!!

A was a fun little project.

If by chance you know anything about this key, please let me know! Have a great day and see you at FDIM at Dayton!



~ Mike VE3MKX

ve3mkxqrp@gmail.com

BCQP—Behind the Scenes

The bands were buzzing

by REBECCA KIMOTO VA7BEC

With more BC operators involved, BCQP 2024 was perhaps the best running ever. Sustained record-high number of districts activated. Official records broken. Personal bests bettered. Really good CONDX. Essentially, lots of factors fueling fun.

At VA7ODX, we were hopping. Steady pileups on both modes. The CW op and I prioritize CQing because we have to keep the on-air presence of the sponsor station high. Running will almost always produce a big log—and that happened—but we more or less have to rely on stations responding to our CQs to expand our multiplier count. Nevertheless, even from this perspective, we felt participation was up.

This sentiment was echoed by the majority of participants in-province and outside BC who posted to 3830 and in emails that accompanied logs.

The fact that CONDX was exponentially better than in past years certainly extended the range of access to BC stations calling "CQ BCQP" because stations near and far could hear us and be heard by us as well. The low-band rally and the list of announced operations probably also underpinned an increase in Qs.

At VA7ODX, we tried to be everywhere, moving from band to band on each mode to maximize CONDX and Q opportunities. I think this was a successful strategy applied by many participants. Certainly, BC operators calling CQ enjoyed a satisfying run rate, which in turn kept them in their chairs. This led to big, big logs—or at least bigger than many BC operators expected—while enabling outside-BC participants to be successful in their hunt for VE7/VA7s.

There was a deep pool of activated districts all over BC to draw from. Very welcome to participants outside BC as well as within the province. Perhaps that's why more operators outside BC tried calling "CQ BCQP. Looking for BC stations."

On PH, trading Qs with MN stations was smooth, and more MN stations dropped by

on Sunday after MNQP was done to add to their BCQP logs. There were a few VT stations throughout the weekend as well.

New strategies in 2024 successful

Rally schedule

This year, we organized a rally on 80m and 160m in the last hour of BCQP on Saturday (0300z-0359z). The cluster showed a nice collection of CQing BC stations, making S&P so much easier for all BCQP participants. Based on data in logs received, 471 Qs took place during the rally hour, with a fairly even split between CW and PH, but not all Qs were on 80m and 160m, perhaps because CW-only operators worked on non-rally bands when the schedule switched to PH, and vise-versa.

The purpose of the rally was to encourage BC stations to congregate on the low bands so that stations near and far could pick up Qs with stations that might be hard to hear on the high bands and collect some lovely multipliers.

Regardless of band or mode, there were mini-bursts of activity, and that's a good thing. The rally appears to have achieved its purpose, so we'll plan for it again in 2025.

Announced operations

In an effort to raise awareness of activity in BC and help operators near and far find BC stations—point antenna in the right direction 'cause BC is a big province!—we posted a list of announced operations.

Just FYI, self-spotting is not an option for BCQP because self-spotting is better suited to QSO parties with mobile ops moving through multiple counties. BCQP is unlikely to have mobile activations, given the size of the province, the difficulty in pinpointing districts while on the road—there are no federal electoral district signposts—and the potential for snow and icy conditions in February. Self-spotting would therefore only make loud, high-power stations all the more noticeable while the struggling, low-power stations that would relish the attention remain largely unheard

Award plaque photos By Rebecca VA7BEC

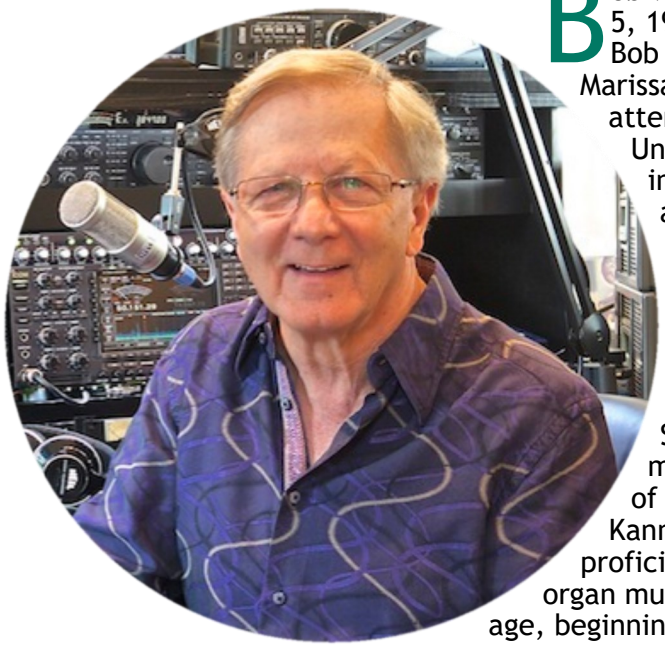
because they don't have the necessary signal strength. Some proponents of self-spotting erroneously think they'll have a non-stop pileup because their callsigns are spotted. But that is not necessarily so. The CQing station must be heard for other stations to respond.

Announcing planned operations, meanwhile, draws attention to all callsigns of committed operators as well as districts that are highly likely to be activated, thereby enabling all BCQP participants to be listening for CQing BC stations and align antenna—rotatable ones anyway—in the best direction.

~ Rebecca VA7BEC,

Bob Heil (SK)

A name synonymous with Amateur Radio



October 5, 1940 - February 28, 2024

Bob was born October 5, 1940 in St. Louis. Bob grew up in Marissa, IL. He attended the University of Illinois in Champaign, IL, and was a member of the Marching Illini and Phi Kappa Tau fraternity. He eventually transferred to St. Louis to study music. A student of the famous Stan Kann, Bob became a proficient theater organ musician at a young age, beginning to perform at various local restaurants at the age of 14. At the age of 15, he became a professional performer on the Wurlitzer theater organ at the Fabulous Fox Theatre in St. Louis.

Heil then opened Ye Olde Music Shop, a successful professional music shop in Marissa, Illinois, which ultimately became Heil Sound.

Bob became well-known for designing the concept of modern rock and roll systems we see today. Bob designed touring sound systems for rock and roll bands such as the Grateful Dead, the Who, and many others. Bob's career was jumpstarted when the Grateful Dead arrived in St. Louis to play the Fabulous Fox in February 1970 without a sound system. Bob provided his own sound system for the show which was such a success that the band asked Bob and his sound system to join them on the road. That led to Bob designing sound and touring with the Who on their Who's Next tour in 1971.

Bob invented the Heil Talk Box, which was frequently used by musicians such as Peter Frampton, Joe Walsh and Richie Sambora, and is still in use today by musicians of nearly every genre. The Heil Talk Box was the first high-powered talk box on the market, which could reliably be used on high-level rock stages. The first Heil Talk Box was built for Peter Frampton's girlfriend to give to Peter as a Christmas present in 1974. It can be heard prominently on his 1975 album, Frampton and 1976's Comes

Alive – one of the best selling live albums of all time. His work made such an impact in the rock and roll industry that Heil Sound was invited to become the only manufacturer featured in a display at the Rock and Roll Hall of Fame in Cleveland, Ohio, in 2006. Some of Bob's historically important gear, including the first modular mixing console (the Mavis), his custom quadraphonic mixer (originally used on the Quadrophenia tour), and the very first Heil Talk Box were included in the display. Bob's work was also featured in the Missouri History Museum in St. Louis, MO.

An avid engineer, Bob proudly became an amateur radio operator at the age of 13 with the call sign K9EID. He spent much of his teen years designing and building homemade transmitters, amplifiers, and antenna systems, including his elaborate "moon bounce" antenna he used with NASA to transmit a signal to the moon and back. In the early 1980s, Bob left the pro sound industry to focus exclusively on the amateur radio market, first under the Melco brand, later returning to the Heil Sound brand, and currently under the Heil Ham Radio brand. Bob became a global innovator in the field of amateur radio, manufacturing headsets, microphones, equalizers, and accessories. Bob was very active in amateur radio giving countless presentations at hamfests and ham radio clubs, and a proud supporter of the Amateur Radio Relay League (ARRL) and multiple youth programs for amateur radio.

Bob was a fixture in St. Louis through his "High Tech Heil" educational segments on KMOX radio plus KSDK and KTVI television. He frequently lectured at major electronic and satellite conventions, including CES and NAB shows in Las Vegas, Trebas Institute in Toronto and Blackbird Academy in Nashville.

In the late 1980s, Heil Sound entered the home theater movement becoming popular in the United States. His company became one of the first to design Custom Home theater systems with over 3,000 systems installed by 2010. Heil installed the very first DSS System, which he placed at the St. Louis office of Bob Costas. He was also on the original test team for the RCA DirecTV dish system and became one of the largest RCA dealers in the world.

In the early 2000s, following a request from Bob's longtime friend Joe Walsh to develop a new vocal microphone, Bob re-entered the pro sound industry and introduced a new line of professional microphones and accessories, which Heil Sound continues to manufacture today. Countless Grammy-winning artists, creators, broadcasters, podcasters, sound engineers, and sound professionals continue to be influenced by Bob's work and products.

Bob won a number of awards and honors. He was the "International Amateur Radio Operator of the Year" in 1982, an award which had been held by Barry Goldwater the year before. He was later awarded the 1989 "USA Satellite Dealer of the Year" by the Satellite Broadcasting and Communications Association in Las Vegas. In 1995, he received the very first "Live Sound Pioneer Award" at the Audio Engineering Society Convention in San Francisco. In 2007, Bob received the Audio Innovator Parnelli Award. In 2014, Bob was awarded an Honorary Doctoral Degree in Music and Technology from the University of Missouri.

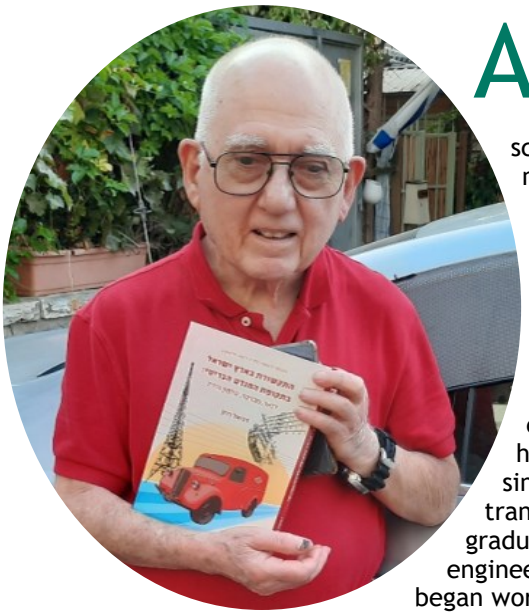
In his retired years, Bob remained active in the amateur radio community by giving presentations to ham radio clubs all across the world.

Robert "Bob" G. Heil, 83, of Belleville, IL, peacefully passed away February 28, 2024 with his loving family at his side at Belleville Memorial Hospital after a very brave battle with cancer. A private family service will be held in his memory.

~

Adam Farson AB4OJ/VA7OJ (SK)

A local ham with worldwide connections



Adam was deeply involved in the Vancouver amateur radio scene. And was a member of the North Shore Amateur Radio Club.

He chose a career as an electronics engineer. He then designed and built his own 20-meter single-band amateur transmitter. After graduating from engineering in 1964, he began working at Racal in Pretoria, where he spent three fascinating years developing portable military HF communications equipment, with 100 watts output power, based on solid-state components. He finally became convinced that the vacuum tubes were out—though it took him many years to convince other radio amateurs that it was…

In 1967 he moved to the CERN European Research Center in Geneva, Switzerland, as an RF engineer, where he designed unique RF equipment for a particle accelerator, and received a Master's degree in engineering from the University of Capetown.

From 1970 to 1972 he worked on the construction of a satellite station for GTE in Israel, a unique venture at the time, specializing in combining the specializations of RF and communications.

In late 1972 he moved to an engineering company in Washington, D.C., which dealt with telephony switching systems, and after a few years he moved to Nortel in Toronto, Canada, where he developed telephony switching systems for five years. In 1976, he returned to amateur radio, with the Canadian callsign VE3DGY, which years later was converted to VE3OJ.

After five years in Canada, he returned to GTE in Chicago, and then moved to Siemens in Florida, where he worked for twenty years, including a year in Japan and a year in Germany, on switching and transmission communications equipment. Adam retired in 1999, with valuable knowledge and experience.

For more than 30 years Adam has set up a radio frequency testing laboratory in his home, and provided technical support for amateur radio, focusing on ICOM equipment. His website, https://www.ab4oj.com/, has become an important source of information for amateur radio operators. Adam focused on advanced software radio technology (SDR) and power amplifiers for amateur radio, and the development of unique measurement methods for advanced HF receivers. For Adam's lecture on the subject, from October 2023 visit: https://youtu.be/hlDb6uJSR_g. The most important development was the NPR (Noise Power Ratio) method Measures SDR receiver performance.

The technical reports Adam wrote on amateur equipment were groundbreaking. Adam helped every radio amateur who approached him, willingly and patiently, and many amateur radio enthusiasts are grateful to Adam.

Adam was awarded a special Technical Achievement Award by the American Amateur Radio Association, ARRL, in March 2022.

Earlier this year, Adam was injured in a car accident, discharged from hospital after a short hospitalization, but died within days, on March 13, 2024, due to complications.

~ Daniel Rosenne, 4X1SK

Ham Radio

Outside the box

Venturing Outside the Box

with the end-fed half-wave antenna

by JOHN CORBY VA3KOT

John Corby VA3KOT resides in Owen Sound, Ontario but is more often found operating CW out in the "Big Blue Sky Shack". He especially enjoys activating parks for the POTA program and blogging about his experiences at HamRadioOutsidetheBox.wordpress.com

So many words have been written about the popular End-Fed Half-Wave antenna that you would think it would be "settled science" by now. For several years I have been building EFHWs according to accepted wisdom, but my inquisitive mind always seeks to question why they are built that way and could they be improved?

You could buy a commercial EFHW and just get on with making contacts, but there is not much to be learned that way. A ham radio license is a ticket to experiment and innovate. Maybe all the ways to improve the EFHW have been explored already, but just like baking a cake, there are many combinations of ingredients each yielding different results.

Because my principal interest in ham radio is operating outside in what I like to call the "Big Blue Sky Shack", the latest build of the EFHW is not targeted toward optimum efficiency. Instead, the primary objective is to build a field expedient, rapid deployment antenna for QRP or QROp (20 watts) that will expedite logging 10 or more QSOs quickly and efficiently for a POTA activation.

The high impedance transformer

If a wire is half of a wavelength long there will be a high impedance at its ends. That much at least could

be accepted as "settled science" (Recent discussion online suggests there are skeptics). So feeding a half-wave wire at its end creates a big impedance mismatch that must be corrected using a transformer.

Ohm is where the art is

Transceivers are usually designed for coax fed antennas with an impedance of 50 ohms. But what is the impedance at the end of a half-wave wire? The answer is we don't really know. It is certainly a very high impedance, but is it 1500 ohms; is it 5000 ohms, or somewhere in between? The actual value depends on how, where and when it was erected. Even for a fixed installation at a home QTH, the impedance could change if it rained overnight.

Conventional wisdom says we should use a transformer with an impedance ratio of 49:1. That implies that the expected antenna impedance is 49×50=2450 ohms. But if the actual antenna impedance is really only 1800 ohms, the transformed impedance will be only 36 ohms. Is that a problem? Not really, the mismatch will be less than 1.4:1 – perfectly acceptable. Similarly, if the actual antenna impedance is 3500 ohms, the mismatch will be the same 1.4:1.

Turns, turns, turns

Okay, so we won't challenge conventional wisdom on the transformer impedance ratio (remembering that the transformer turns ratio is the square root of the impedance ratio, i.e. 7:1). Now, how many actual turns are required? Once again, conventional wisdom has an answer to that question too. Wise men tell us we should use either 2 or 3 turns on the primary and either 14 or 21 turns on the secondary respectively. Which to choose? I believe the 3:21 turns ratio is probably required on the lower bands, e.g. 80m but that 2:14 is adequate for the higher bands. So, 2 turns on the primary and 14 turns on the secondary fits the requirements for our POTA field antenna. It will be used for the 40-10m bands, but principally 20m where most POTA activity can usually be found.

The core of the matter

Wise men say the transformer should be wound on a ferrite core made from type 43 material, but they disagree on what diameter core, and on how many cores are needed. If you are a QRO operator with a 1500 watt "boot" then go ahead and stack 'em high; 3 stacked FT240-43 cores should do it. But if you are a QRP operator, one of those tiny cores the size of a wedding ring is good enough.

It's an open and shut case

Ferrite cores can overheat, so why put them inside a sealed enclosure? You may need to protect the transformer from the weather if it's a permanent installation but for a field expedient antenna, let them breathe the air. I have never had a problem with cores overheating when operating low power for typically an hour or so and mine are not enclosed.

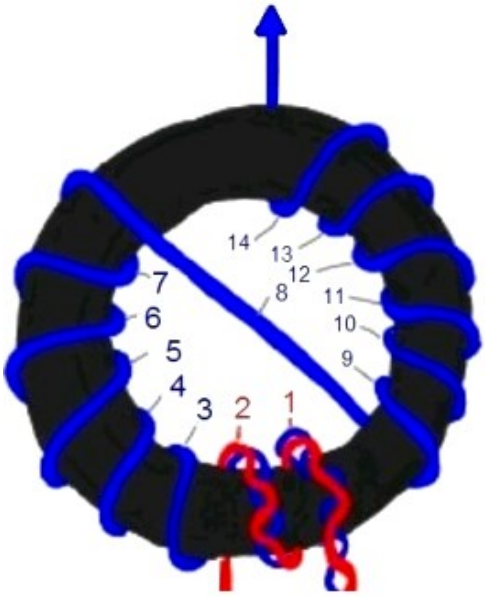
Wise men say the more cores the better the transformer. I am not entirely convinced, but there is merit to the argument that if more copper is inside the core, the magnetic linkage is better. On that basis I chose to build my EFHW transformer using 2 stacked FT140-43 cores. Stacking 2 medium size cores means that the coil windings are inside the core for twice the distance of a single core. I also built a purely QRP transformer using a single "wedding ring" core (I think it's an FT80-43). As the ferrite toroid diameter decreases so does its thickness, so there is very little wire inside the very small core and it may be less efficient (although I have QSOd with it).

It ain't over 'til it's over

Who would have thought there are so many things to consider just in building a simple EFHW transformer? Well we aren't at the finish line yet. Now we have to think about HOW to wind the transformer. I have come across 3 different ways. Wise men disagree again but one method seems to have attracted the most disciples.

Let's do the twist

This first winding method creates an autotransformer. An autotransformer shares some of its windings between its primary and its secondary. In this method there is a slight variation on that idea. The primary and secondary windings are shorted together at the start, then the first 2 turns are tightly twisted together. The remaining 12 turns of the secondary include a crossover turn which serves only to bring the far end out on the other side of the core.



Method 1 - 49:1 autotransformer

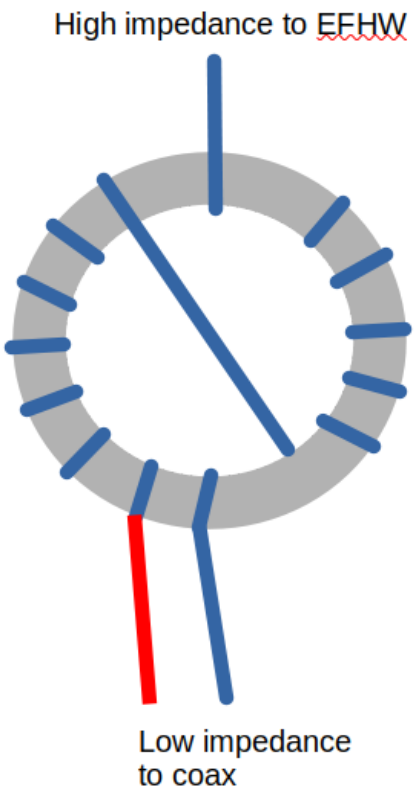
A second winding method *[image top right]* merely places a tap after 2 turns on the secondary. I have tried this method but it didn't work very well.

In both the above methods the start of the primary and secondary windings are shorted. The antenna then has a direct DC path through the secondary to the coax braid which can be used as a counterpoise.

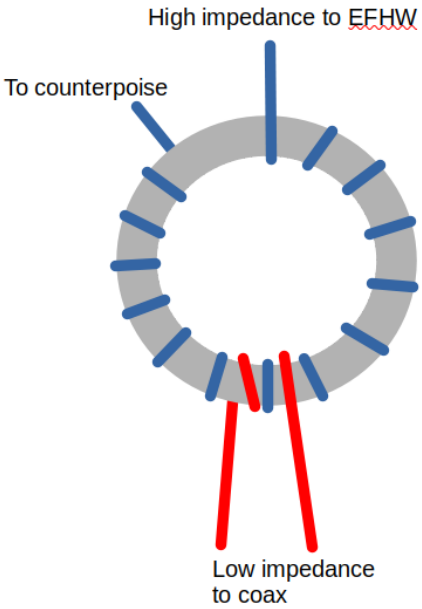
There is a third method that results in a conventional transformer with no DC connection between the primary and secondary. Instead, 14 turns of the secondary are wound on the core. A separate 2 turn primary is then wound, either elsewhere on the core, or on top of the secondary winding. I chose the latter since it probably improves the magnetic linkage between the windings. Another factor to consider here is that there is now no DC connection between the secondary and the coax braid. Can the coax braid still be used as a counterpoise?

A counterpoise... for an EFHW?

The feedpoint at the end of a half-wave wire is a high voltage point. This means there is very little current at the feedpoint, so do we really need a counterpoise? For QRP the answer is no, for higher power though a counterpoise is recommended to avoid RF in the shack. My own use case involves no more than 20 watts but since I chose the third winding method with no DC connection between the antenna wire and the coax, I added a short (~6ft) counterpoise wire connected to the opposite end of the secondary winding to the radiating wire.



Method 2: 49:1 autotransformer



Method 3: 49:1 transformer

49:1 transformer on winder. Note the silicone coated ultra flexible wire and SO-239 jack.

Isn't this just an Off-Center Fed Dipole?

I have seen this question raised online and the answer is no. It might appear to resemble an OCFD at first glance; we have a long wire fed 6ft from one end. But, an OCFD is a half-wave long, while this antenna is longer by 6ft. We are feeding our EFHW at a high voltage point. An OCFD is usually fed at around 1/3 of its length.

49:1 showing 2xFT140-43 ferrite cores. No case, insulated wire protects windings from moisture.

A capacitor on the primary?

Wise men say we should install a 100pF, high voltage capacitor in parallel with the primary. I have tried this but it didn't seem to have any effect so I don't use it any more.

A Common Mode Current Choke (CMCC)?

A Common Mode Current Choke is recommended (again, by the wise men) at the input to the transformer. This will prevent the coax braid being used as a counterpoise. Is it a good idea? Well, since I have a separate counterpoise wire on the transformer secondary then yes, I have installed a CMCC. As with any antenna, a CMCC at the radio end of the coax is a good idea to block RF induced from the near field reaching the radio.

Are we there yet?

We are nearly there, because there is yet another variant. Steve Yates AA5TB is a master of the End-Fed Half-Wave antenna. His matching device replaces the 49:1 broadband transformer with a parallel tuned circuit providing a match on just a single band. The broadband 49:1 will work on the primary band plus all its harmonics.

Oh wait, there's a gotcha!

An End-fed Half-wave antenna is really only a half-wave on one frequency. Let's say we design our EFHW for 40m. The length of the antenna wire will be a half -wave on 40m, a full-wave on 20m, 3 half-waves on 15m and 2 wavelengths on 10m. The conditions on a wire repeat every half wavelength but, instead of a single high current point (as is the case at the midpoint of the wire on 40m) there will be multiple high current points. Each high current point is a point at which maximum power is radiated and may lead to an irregular radiation pattern with multiple nodes and nulls. Yikes!

High Voltage Beware!

So maybe AA5TB had the best idea by choosing a single band EFHW. But let's say we want to follow the other wise men and use a broadband antenna anyway. If we build an EFHW for 40m it will have a length of nominally 66 feet. The real length will be shorter due to the end effect; around 62 feet works for me. Often that's too long for operating in a public space. We have to be careful because the far end of our wire is a high voltage point which potentially endangers other park users like children and dogs.

Exactly how high is the voltage at the far end of the antenna? Rough calculations show that for QRP it is only a little over a hundred volts; not enough to cause bolts of lightning but enough to give hams a bad rap if a child came in contact with our wire.

Use a loading coil and tail wire to shorten the antenna

We can instead build an antenna for 20m and electrically extend it for 40m using a loading coil with a tail wire at the end. In his YouTube channel, Tim G5TM proposed using a 35 microhenry loading coil with a short tail wire. The coil is attached at the end of the 20m EFHW and adds only about 6ft to the overall length of the antenna. I have used this technique in the past to extend a 40m EFHW to cover 80m. Because the coil/tail wire combination is much shorter than the equivalent full length wire, the Q is very high. I found out that trimming the tail wire for best SWR is a very delicate process!

This technique works very well but it does introduce another gotcha. Due to the end effect (shortening of a wire due to capacitive connection to ground) our 20m EFHW works out to about 31 feet long versus a calculated length of around 33 feet. But when we connect our loading coil, the 31ft radiator is now terminated and no longer subject to end effect – so it is now too short! In a comment on a prior post, Ham Radio Outside the Box reader David VE7EZM introduced us to the idea of using a short drop wire to compensate for this. Following David's advice I attached a 2ft drop wire at the point where the 31ft wire meets the coil. The drop wire simply hangs in the air and restores the tuning on 20m.

So , what have we wrought?

The final rebuilt EFHW antenna comprises a 49:1 conventional transformer (per method 3). The radiating element is a 31ft wire and is attached to one end of the transformer secondary. The counterpoise wire is 6ft long (0.05 wavelengths on 40m) and is connected to the other end of the transformer secondary.

A 35 microhenry loading coil is attached to the end of the radiating element with a 2ft drop wire as described above. The tail wire is approximately 6ft long and is adjustable for fine tuning in the field.

35 microhenry loading coil for 40m band. Note the 20m drop wire and 40m tail wire.

This antenna will theoretically cover 40m, 20m, 15m and 10m. My principal bands of interest for POTA activations are 20m and 40m although I may stray onto 15m and 10m from time to time.

I am inclined to believe an EFHW will give better performance on its primary design band than on its harmonics, so I am entertaining the idea of using interchangeable radiating element wires for each band. I may post further on this topic after some experimentation.

End-Fed Half-Wave antennas are a controversial topic; some operators love them, others do not; everybody has an opinion. My own idea is to use my EFHW for field portable use where convenience overrides perfection. As always, I am no expert (x is an unknown quantity and spurt is a drip under pressure) so please excuse and maybe correct any errors. If you have any ideas to add to this discussion please add them to the comments below.

I found the following article very helpful in understanding the EFHW; I recommend reading it:

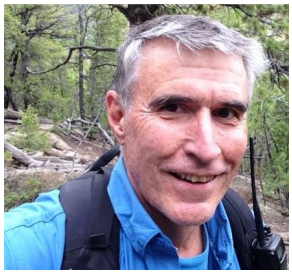
https://batteryeliminatorstore.com/blogs/ocf-masters-articles/a-deep-dive-into-end-fed-half-wave-antennas

~ John VA3KOT

Common Ham Shack Radio Configurations

Amateur radio transceivers have improved

by BOB WITTE K0NR



Bob Witte K0NR maintains a great blog site at https://www.k0nr.com/wordpress/

Amateur radio transceivers have improved dramatically over the decades and they pack a lot of capability into relatively compact radios. In this post, we will take a look at the typical configurations and how they may impact setting up a flexible amateur radio station today. This discussion is focused on currently available new gear, with 50 to 100 watts of RF power.

The Kenwood TS-430S was a popular HF transceiver in the 1980s.

The most common HF radio configuration used to be a 5-band model that offered CW, AM, and SSB on 80 meters, 40 meters, 20 meters, 15 meters, and 10 meters. In the early 1980s, the WARC bands were added (named for the World Administrative Radio Conference of 1979) that authorized these new bands. The WARC bands are 30 meters, 17 meters, and 12 meters. These attractive new bands were soon added to the standard HF rig. Most HF radios include 160 meters (actually a Medium Frequency or MF band) on the low end and a general coverage receiver for 150 kHz to 30 MHz. So these days, the typical HF transceiver handles 9 bands and many different modes. (Actually, most of these rigs now include 6 meters, more on that later.)

Dominant Design

In the world of product development, the concept of a dominant design often emerges. This generally accepted approach dominates a particular market and is considered the standard way of doing things in a particular product category.

From Wikipedia:

> ***Dominant design*** *is a technology management concept introduced by James M. Utterback and William J. Abernathy in 1975, identifying key technological features that become a de facto standard. A dominant design is the one that wins the allegiance of the marketplace, the one to which competitors and innovators must adhere if they hope to command significant market following.*

We will see that most ham radio gear conforms to the concept of a dominant design. That is, certain product configurations become standard, especially in terms of frequency bands and modes. Manufacturers still innovate by adding new features in an attempt to differentiate and obtain competitive advantage but the basic capabilities are standard. The dominant design for HF transceivers is the 100-watt radio that covers 160m through 6m.

VHF/UHF Radios

For VHF/UHF, the situation is a bit more scattered. 2-meter FM is the most popular band and back in the olden days, it was common to just have a single-band 2m FM rig in the shack. To cover 70 cm FM, a radio ham needed a second radio but later dual-band radios showed up that covered 2m and 70 cm. Today, the dominant design for VHF/UHF is the dual-band FM transceiver (typically 50 watts of output power) and there are so many of these available I won't attempt to list them.

The IC-2730A is a basic 2m and 70cm transceiver with dual receivers.

VHF FM is the utility mode for amateur radio and many hams are just fine using FM (or one of the digital voice modes) on VHF/UHF. Those who want to stretch the limits of VHF/UHF operating usually go for all-mode rigs that offer CW, SSB, FM and various WSJT digital modes. Again, back in the olden days, a VHF+ enthusiast would acquire single-band all-mode radios for the bands of interest. A ham really into VHF/UHF might have single-band radios for 6m, 2m, 1.25m, and 70 cm stacked up in the ham shack. The 1.25-meter band has always been a bit neglected in terms of equipment availability because that band is not available worldwide. Transverters are another option to get all-mode capability on these bands using an HF transceiver to transvert to a single VHF or UHF band.

HF Plus 6 Meters

One important addition to the standard HF rig is that the 6m band is often included. Now this may not sound quite right because we all know that 6 meters is a VHF band, so what is it doing in an HF radio? It actually makes a lot of sense because a lot of 6-meter operating is similar to HF. (6 meters is the VHF band that often emulates HF.) There is FM activity on 6 meters but most of the action is on SSB, CW, and, yes, FT8. In fact, FT8 is seeing a lot of action on the band, so if you want to participate on 6m, you should consider that mode. Anyway, this all means you probably need an

The IC-7300 transceiver covers all the HF bands and 6 meters (50 MHz).

all-mode radio for 6 meters, and having it as a bonus band on an HF radio without a huge increase in cost is a good approach. (These radios usually support FM for the 10m and 6m bands.)

There are many great HF/6m radios to choose from so I won't try to list them all. Some of the more popular ones in the $1k to $1.5k range are: Icom IC-7300, Yaesu FT-710, and Yaesu FT -DX10.

All-Band All-Mode Rigs

Another common transceiver configuration is the All-Band All-Mode radio available from several manufacturers. A great example of this type of radio is the Yaesu FT-991A, which includes 160m through 10m plus 6m, 2m, and 70cm. Once again, 1.25m is passed over. This radio configuration has a lot of appeal because it covers pretty much everything with all-mode capability. (It also has a built-in sound card and USB connection which is handy for the WSJT digital modes.) The FT-991A is a good choice for the ham shack or operating portable but it is a bit large for a mobile installation. Icom offers the IC-7100 in a mobile form factor, with a novel sloping detachable front panel. Yaesu used to offer mobile products in this space such as the very popular FT-857D transceiver. However, the FT-857D is no longer made and its apparent replacement is the FT-891 which has only the HF + 6m bands.

The Yaesu FT-991A covers 160m through 10m, plus 6m, 2m and 70cm.

The main disadvantage of this type of radio is that it can only do one frequency at a time. Often, I want to be able to work HF while still monitoring the local 2m FM repeater and simplex channels. Or maybe I'd like to keep listening for 6 meter activity while working 2m SSB, especially during a contest. However, this type of radio is my first choice for portable operating for Parks On The Air because it covers all the bands and modes. This article is focused on 100-watt radios but note that there are all-mode all-band QRP radios such as the IC-705.

The Icom IC-7100 is a mobile rig with HF, 6m, 2m, and 70 cm.

All Mode VHF/UHF Radios

One interesting and disappointing trend that has emerged is the distinct lack of VHF/UHF all -mode transceivers. There is only one such radio on the market today, the Icom IC-9700 which does all modes on 2m, 70cm, and 23 cm (1.2 GHz). It seems that Icom decided that if they are going to offer a VHF/UHF radio, they would go full-featured and include 23 cm. Note that if you pair this radio with an HF plus 6m radio, you can cover all the popular bands with all modes using two radios. This radio is not inexpensive, currently selling new for about $1800.

The Icom IC-9700 is a VHF/UHF transceiver that offers all modes on 2m, 70cm and 23cm.

I suppose we can declare this the dominant design for VHF/UHF but it is a lone product in this space. I have written previously about an all-mode dual-band portable radio for 2m/70cm that I desire. I own an IC-9700 and like it a lot but I would give up the 23 cm band to have a radio that is more portable and less expensive. I suspect that Icom is happily

making good profit margins on the IC-9700 given that they have essentially no competition in this space. Yaesu has the technology to do something here but has been content to let the FT-991A cover the all -mode 2m/70cm space for them.

Common Ham Shack Setups

Now let's take a look at some common ham shack configurations that consider these different radio configurations. When I say "ham shack" that may include your mobile or portable station, too.

Setup 1: FM VHF/UHF Only A Technician might decide they want to focus on 2m and 70cm, with FM being just fine for working simplex and repeaters on those bands. A basic dual-band FM transceiver will handle this nicely, see A VHF FM Station at Home. For some hams, their dual-band handheld radio serves this purpose.

Setup 2: All-Band All-Mode Transceiver As mentioned earlier, All-Band All-Mode radios cover the most popular ham bands and modes with one rig. They are a good way to get one radio that does everything. The disadvantage is not being able to monitor VHF/UHF at the same time as working HF.

Setup 3: HF/6m radio plus 2m/70cm FM radio This is a very common configuration for a ham shack because it separates the HF bands (and 6m) from the 2m/70cm FM operating. The FM rig can be left monitoring your favorite repeater or simplex frequency while you chase DX on 15 meters. If your 2m/70cm needs are basic, the FM radio might even be a handheld transceiver.

Setup 4: HF/6m radio plus all-mode VHF/UHF radio This is the setup for the ham that wants to cover all the bands and be able to do all modes on VHF/UHF. The band/mode coverage is similar to Setup 2 but we have two radios available which provides the monitoring flexibility associated with Setup 3. This configuration allows for having a really good HF/6m radio and a really good VHF/UHF radio.

Conclusions

The ham radio transceivers being offered tend to follow certain patterns consistent with the dominant design theory. If you buy a modern HF transceiver, you will likely get all of the HF bands plus the 6m bonus band. These radios vary in features and performance but they all have good band/mode coverage. The VHF/UHF situation is perhaps not quite as simple. The standard 2m/70cm FM rig is a popular option but is limited to FM only. The VHF/UHF weak-signal enthusiast does not have many choices beyond the IC-9700, which may represent an opportunity for another manufacturer to jump in with a more cost-effective 2m/70cm all-mode radio. The 1.25m band continues to be neglected and may be a good additional band to add to 2m/70cm radios.

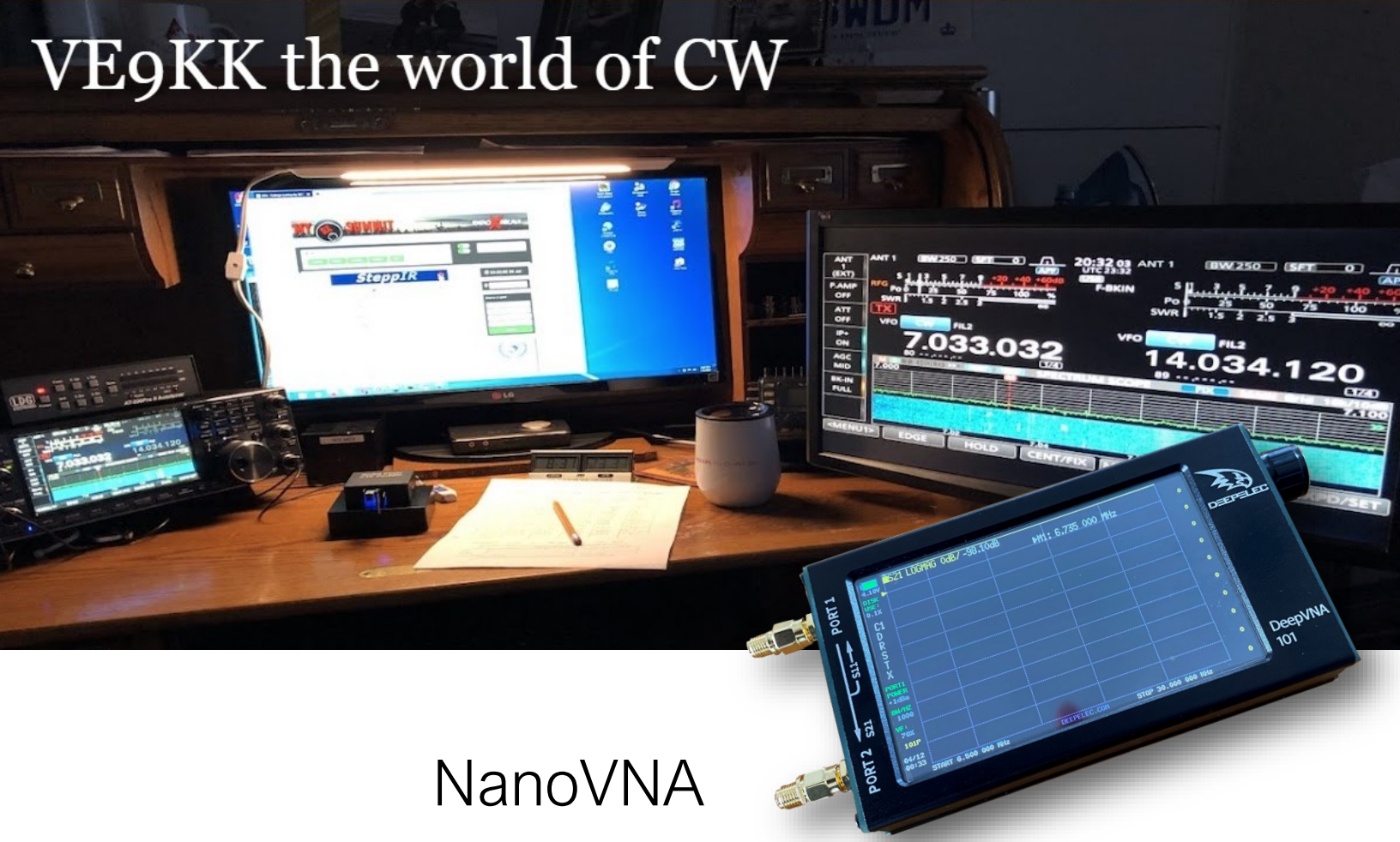
That's my analysis. What do you think?

~ Bob KØNR

Check out Rob's book
VHF, Summits and More: Having Fun With Ham Radio.

This book is an easy-to-understand introduction to VHF/UHF ham radio, including practical tips for getting on the air and having fun messing around with radios. Learn about FM, SSB, repeaters, equipment, band plans, phonetics, portable operating, Summits On The Air (SOTA) activations and more.

VE9KK the world of CW



NanoVNA

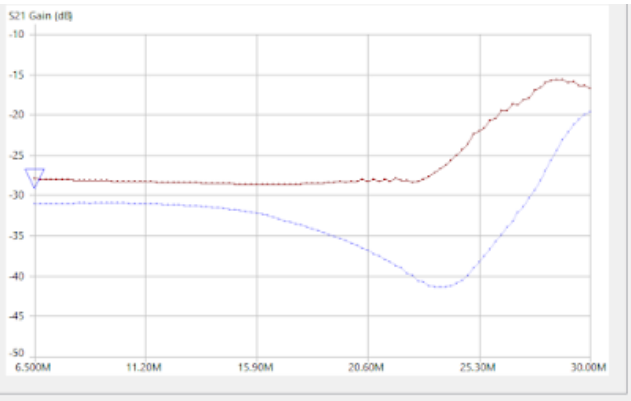
and checking a common mode choke

by MIKE WEIR VE9KK

Mike Weir VE9KK was first licensed in 1989 and upgraded to advanced in 2000. He primarily operates contests both CW and RTTY.
His blog is at: [VE9KK the world of CW]

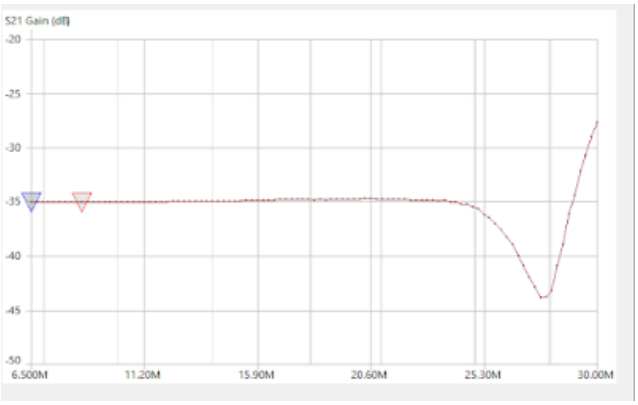
Last week a new toy arrived a NanoVNA and I have been playing around with it and learning the ins and outs of the unit. This unit allows me to check antenna SWR, attenuation and coax switch isolation to name a few things. I am not going to get into the details of the NanoVNA as there is lots of information for those interested available on the internet. My first project was to check the attenuation on one of the common mode chokes I made. It was made from RG316 coax, FT 240-31 mix toroid and had 10 turns on it. I never put this common mode choke through any testing as I did not have anything to test it. I was going by some charts, the type of toroid mix and the number of turns needed for 40m to 10m.

Now that I had a NanoVNA I could perform an attenuation test on the common mode choke I was using and see some actual numbers. I have been reading and -30dB or more across 40m-10m is great for a common mode choke. I calibrated the NanoVNA and performed an attenuation test and to my surprise, the common mode choke I made failed! The common mode choke I made was above -30dB from 40m to 10m. It was not time to fix the problem and bring my readings below -30dB.



The red line is the results

I tried reducing the windings around the core increasing them and doing a NanoVNA sweep each time to see the results. My final result was 14 windings and that gave me the ideal results. The NanoVNA indicated -35dB on a full band sweep (6.5MHz to 30MHz) on individual band sweeps the readings were 10m -44dB, 15m -34.5dB, 20m -35dB and 40m -35dB. I am much more pleased with these readings.



Full band sweep

The software to display the readings is called NanoVNA saver, it's free and works great. I am very pleased with the results from the NanoVNA and I was able to check and fix my common mode choke. I will now move on to the next project and that is the isolation between antenna 1 and 2 on my LDG AT200pro2 but more on that in another post.

It's antenna farm time

Before I purchased my Hustler 4BTV vertical antenna I was using a 45 foot End-fed antenna. I have kept the End-fed antenna coiled up and ready to go along with the coax still attached. The Hustler vertical only gives me 40, 20, 15 and 10m which is great for contesting BUT if I wanted to venture on to other bands it would mean using the End-fed antenna. Also during high wind storms or freezing rain, I have taken the Hustler vertical down and left with no antenna. I have been thinking of bringing the End-fed antenna back to life and using it when the Hustler is down due to weather and to venture on the bands the Hustler does not cover.

I rehung the End-fed antenna recently to run it through the paces with my antenna analyzer to make sure after sitting unused for so long there were no issues. It checked out just fine and the SWR was decent and where it was a bit high my trusty LDG AT-200pro II would look after it. The main obstetrical for me is the proximity of the two antennas when they are both up at the same time. My next test was to connect my End-fed antenna to my Daiwa CN-901 antenna port and a 50-ohm dummy load to the radio port. I then wanted to transmit 100 watts into my Hustler 4BTV antenna and see what type of reflected power the Daiwa CN-901 SWR meter was showing. Below are the results for 40, 20, 15 and 20m on the 20 watts scale.

40 Meters

20 Meters

15 Meters

10 Meters

The reflected power was not significant and 10m was the highest. I plan to disconnect whichever antenna I am not using and connect it to a 50-ohm dummy load. In the future, I may prefab a 12-volt relay to switch between each antenna and use the relay contacts as the isolation point. For now, it is going to be the dummy load solution.

~ Mike VE9KK

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KB6NU'S HAM RADIO

Need to wind some toroids?

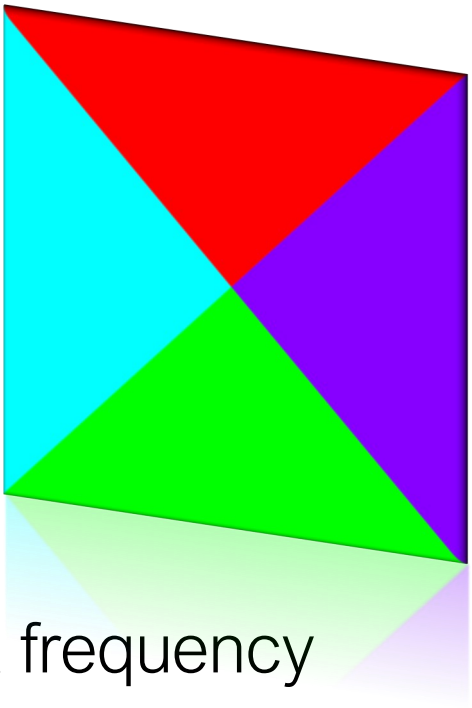
A YouTube video

by DAN ROMANCHIK KB6NU

Dan Romanchik KB6NU blogs about amateur radio at KB6NU.com when he's not trying to figure out which way current flows. Dan teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com

While I'm waiting for my QRPLabs' QMX kit to arrive, I thought I'd try to learn something about toroid winding. This video takes toroid winding to a whole new level [https://youtu.be/Mh9jXCeSong].

Foundations of Amateur Radio



Finding the right frequency

Onno Benschop
VK6FLAB
To listen to the podcast, visit the website: http://podcasts.vk6flab.com/. You can also use your podcast tool of choice and search for my callsign, VK6FLAB.

Full instructions on how to listen are here: https://podcasts.vk6flab.com/about/help

by ONNO BENSCHOP VK6FLAB

Today I'm going to spend a little longer with you than usual, but then, I think this is important and it's good to end the year on a bang.

Have you ever attempted to make contact with a specific DXCC entity and spent some time exploring the band plan to discover what the best frequency might be to achieve that? If you got right into it, you might have gone so far as to attempt to locate the band plan that applies to your particular target. If you have, what I'm about to discuss will not come as a surprise. If not, strap yourself in.

When you get your license you're hopefully presented with a current band plan that is relevant to your license conditions. It shows what frequencies are available to you, which modes you can use where, and what power levels and bandwidth are permitted. It should also show you if you're the primary user or not on a particular band. If you're not sure what that means, some frequency ranges are allocated to multiple users and amateur radio as one such user is expected to share. If you're a primary user you have priority, but if you're not, you need to give way to other traffic.

It should come as no surprise that this is heavily regulated but as a surprise to some, it changes regularly.

Across the world, frequency allocation is coordinated by the International Telecommunications Union, the ITU, and specifically for amateur radio, by the International Amateur Radio Union, the IARU. It

coordinates frequencies with each peak amateur radio body. The ITU divides the world into three regions, Region 1, 2 and 3, each with its own band plan. Within each region, a country has the ability to allocate frequencies as it sees fit - presumably as long as it complies with the ITU requirements. As a result, there's not one single picture of how frequencies are allocated.

And this is where the fun starts.

In Australia there's an official legislated band plan, cunningly titled F2021L00617. It contains the frequencies for all the radio spectrum users as well as a column for each ITU region. The document is 200 pages long, and comes with an astounding array of footnotes and exclusions. It's dated 21 May 2021. There's a simplified version published by the Wireless Institute of Australia, which comes as a 32 page PDF. It was last updated in September 2020. When I say "simplified", I'm of course kidding. It doesn't include the 60m band which according to the regulator is actually an amateur band today. The 13cm band according to the WIA shows a gap between 2302 and 2400, where the regulator shows it as a continuous allocation between 2300 and 2450 MHz. The point being, who's right? What can you actually use?

Oh, the WIA does have a different page that shows that 6m "has had some additions", but they haven't bothered to update their actual band plan.

To make life easier, the regulator includes helpful footnotes like "AUS87". This is particularly useful if you want to search their PDF to determine what this actually says, since it only appears 156 times and it's not a link within the document. In case you're curious, it's related to three radio astronomy facilities operated by the Commonwealth Scientific and Industrial Research Organisation, better known as the CSIRO, two by the University of Tasmania and one by the Canberra Deep Space Network. Interestingly the Australian Square Kilometer Array and the Murchison Widefield Array don't feature in those particular exclusions, they're covered by footnote AUS103.

If that wasn't enough. The regulator has no time for specific amateur use. You can find the word Amateur 204 times but there's no differentiation between the different classes of license which means that you need to go back to the WIA document to figure out which license class is allowed where, which of course means that you end up in no-mans land if you want to discover who is permitted to transmit on 2350 MHz.

If we look further afield, in the USA the ARRL publishes half a dozen different versions, each with different colours, since black and white, grey scale,

All podcast transcripts are collated and edited in an annual volume which you can find by searching for my callsign on your local Amazon store, or visit my author page: http://amazon.com/author/owh. Volume 7 is out now.

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If you'd like to join a weekly net for new and returning amateurs, check out the details at http://ftroop.vk6flab.com/, the net runs every week on Saturday, from 00:00 to 01:00 UTC on Echolink, IRLP, AllStar Link, IRN and 2m/70cm FM via various repeaters.

If you'd like to participate in discussion about the podcast or about amateur radio, you can visit the Facebook group: https://www.facebook.com/groups/foundations.itmaze

This podcast episode was produced by Onno (VK6FLAB). You can find more at http://vk6flab.com/

colour and web-colour are all important attributes to differentiate an official document. Of course, those versions are now all six years out of date, having been revised on the 22nd of September 2017. The most recent version, in a completely different format, only in one colour, has all the relevant information. It shows a revised date of 10 February 2023, that or, 2 October 2023 because of course nobody outside the US is ever going to want to refer to that document - seeing as there's only amateurs in the USA, well at least according to the ARRL.

Interestingly the US Department of Commerce, the National Telecommunications and Information Administration, Office of Spectrum Management publishes a colourful chart showing the radio spectrum between 3 kHz and 300 GHz. You can't use it as a technical document, but it's pretty on a wall to amaze your non-amateur friends. The FCC has a band plan page, but I couldn't discover how to actually get amateur relevant information from it.

If you think that's bad, you haven't seen anything yet.

The British are special. The RSGB publishes a variety of versions, each worse than the next. It appears that their system creates a single HTML page for each band, their 32 page PDF is a print out of that and their interactive viewer wraps all that into some proprietary system that makes using it an abysmal experience. Fortunately, they also link to a band plan made by the regulator, presented as a five page PDF which is much more concise and has the helpful heading: "The following band plan is largely based on that agreed at IARU Region 1 General Conferences, with some local differences on frequencies above 430MHz."

Unfortunately it doesn't specify which particular General Conferences apply, but it does helpfully tell us that it's effective from the first of January 2023, unless otherwise shown. That said, 2023 only appears in the headers and footers and 2024 doesn't appear, so who knows what date exceptions exist.

One point of difference is that the RSGB also publishes their band plan as an Excel Workbook. This might start your heart beating a little faster with visions of data entry, sorting, filtering and other such goodies, like figuring out which frequency to use for a particular mode. Unfortunately the authors have used Excel as a tool for making tables like you'd see in a word processing document. Start and Stop frequencies in the same cell, random use of MHz, spacing between bandwidth and frequencies and descriptions intermingled. In other words, this is not an Excel Workbook and it does not contain information in any usable form, unless you want to do some free text searching across the 32 worksheets - what is it with 32 anyway? Perhaps this is their authoring tool and they save as HTML from within Excel or print to PDF. Who knows?

One point that the British do get right is version control. You can see specifically what change was introduced when. For example, on the 6th of March 2009 the 17m QRP frequency was corrected to 18086 kHz. Mind you, there's several pages of updates, helpfully scattered across multiple worksheets. Yes, they're really using Excel as a word processor.

Before I dig into any other countries, I should mention the United Nations Amateur Radio peak body, the IARU, presumably a model that countries should aspire to. The IARU has links to three different sets of band plans. Region 1 breaks the band plan into HF and higher frequencies and the higher frequencies are broken into notional bands, each with their own PDF. Regions 2 and 3 each provide a single PDF, but the Region 3 document is hosted on the Region 2 website. Region 1 documents contain a revision and an active date as well as an author. Region 2 and 3 documents contain

a date and are formatted completely differently.

In Germany the DARC attempts to link to the IARU-Region 1 band plan, but the link is pointing at a non-existent page.

In the Netherlands, VERON points at a 2016 edition of the IARU-Region 1 HF band plan and the current Region 1 mixed band plan for higher frequencies.

In Canada the RAC points at a HTML page for each band and presents all the HF frequencies as a single image, yes an image. All the other bands are essentially text describing how to use a particular band. The HF image states that it applies from the first of June 2023, the rest of the pages carry various dates that conflict with each other. For example, the 2m band states on the landing page that it was updated on the 23rd of September 1995, but the page itself refers to a new 2m band plan that was approved in October of 2020. The linked band plan contains all the credit, who is responsible for the plan, naming the entire committee, adding notes and requesting donations, straight from the RAC newsletter, page 36 and 37 of the November / December 2020 edition, rather than providing a stand-alone technical document.

Let's hop back across the Atlantic and see what else we can learn.

In Switzerland things are a little different. Its regulator publishes a frequency allocation plan that is a thing of beauty. It presents as a table on a web page, but it has a search box you can use to filter the frequencies that you're interested in. So if you use the word "amateur", you end up seeing the whole amateur radio spectrum as it exists within the borders of Switzerland. You can also set frequency ranges and as a bonus, if you type in 1 MHz and change the unit to kHz, it actually changes the number to 1000. As I said, a thing of beauty. Oh, and the footnotes? Yeah, they're links and they open a new window with the relevant information, and you can keep clicking deeper and deeper until you get to the actual legislation driving that particular entry. If that's not fancy enough for you, from within the search, you can download an offline HTML copy, you can pick services, rather than use search terms, and the PDF version, because of course there is one, actually has the same active links to footnotes.

That said, it has some idiosyncrasies. It specifies when amateur radio is the primary or the secondary user of a band, except when it doesn't. I presume that this is a regulatory thing and that it's a shared resource, but as an outsider I'm not familiar with Swiss law, but if I was inclined, I could become familiar, since the documents are all written in multiple languages, including English. Another oddity is that some frequencies show no text at all, but I presume that's a bug, rather than by design.

Speaking of bugs, or features, depending on your perspective. Consider the frequency 2300 MHz. Every single document I looked at mixes up how this is shown. Some have a space between the number and the unit, some don't. Some countries put a space between the 2 and the 3, some a dot, some a comma, the Swiss use an apostrophe. Just so we're clear, these are technical documents we're talking about. They're not literary works, there are standards for how to do this, but it seems that the people writing these documents are blissfully unaware of any such references. Even the IARU cannot agree on how to represent the same number, let alone use the same formatting for the same band plan in each of its three regions.

At this point you might come to the conclusion that this is all an abhorrent mess and I'd agree with you. In my opinion, it goes directly to how important our hobby is in the scheme of things and just how little funding is allocated to our activities.

It also shows that there are contradictory sources of truth and not a single unified view on how to present this information to the global amateur community. In case you're wondering why that matters, electromagnetism doesn't stop at the political boundaries of the location where we might find ourselves and if that doesn't matter to you, consider again how you'd best talk to an amateur of any given DXCC entity and on what particular frequency you might achieve that.

So, aside from whinging about it, what can you do about this?

I have started a project, of course I have, that attempts to document two things, well, three. First of all I use the WIA version of the DXCC list - since the ARRL doesn't actually publish that for free anywhere - and use that to track a list of hopefully official frequency allocation documents. I'm also in the process of capturing the content of each of those documents into a database, so we can all figure out what the best frequency is to talk to another country.

I'm still in the design stages for the database, for example, do we want to store a frequency in Hertz, in kHz, or pick a magnitude and store a number? Each of these choices has long term implications for using the tool. Then there's things like discovering which band plan applies to Scarborough Reef, the San Felix Islands and Pratas Island to name a few, since I've really only scratched the surface with the plans I've explored.

I had visions of putting this on GitHub, but perhaps this should be part of the Wikipedia collection and it should live there. I'm still considering the best plan of attack. In the meantime, you can help. Please send an email to cq@vk6flab.com with the official band plan link for your own DXCC entity, and if you have thoughts on how best to structure the database or where this project should live, let me know.

For example, should the database include just band plans, or should we also include things like modes. For example, the official VK calling frequency for 40m is 7.093 MHz. Should that be in the database and should we include the preferred Olivia calling frequency? While looking at that, consider the band labels we use. Australia doesn't have a 75m band, but others do. Some countries refer to the 4mm band, others refer to it by frequency.

So, over to you. Let me know what you think. I'll leave you with a quote by Daren 2E0LXY:

"It is not the class of licence the Amateur holds but the class of the Amateur that holds the licence."

~ I'm Onno VK6FLAB

During a contest I made a contact with John HK3C in Columbia. He recognized the club's callsign and commented that he reads and loves the club's Communicator magazine. He was very impressed with the quality and relevance of the content. Big kudos for putting so much work into the Communicator, it gets recognized around the world.

73,

Dmitry VA7DVO

No-Ham Recipes

Florida key lime pie

by LIBBY STEVENS VE3IO//VE3BC

Libby reminisces, "We owned a house in Florida and spent many winters there. We were fortunate to have key lime trees in our back yard. I enjoyed making key lime pies for our guests.

I squeezed the key limes and bottled and froze the juice to take back to Canada so I could make special treats for my dinner guests.

- 4 eggs
- 1 can sweetened, condensed milk
- ½ cup (125 ml) key lime juice (or bottled lime juice)
- 3 to 4 tablespoons (45 ml to 60 ml) granulated sugar
- ⅛ teaspoon (.65 ml) cream of tartar

Preheat oven to 250F (130C or a very slow oven)

Beat 4 egg yolks; add condensed milk and lime juice, heat until thick. Pour into baked pie shell.

For meringue topping, beat the egg whites until stiff. Add cream of tartar and the sugar very slowly. Place pie on cookie sheet and bake for 20 minutes until meringue is golden brown.

~

Back to Basics

From The Canadian Basic Question Bank

Ladder Line:

Understanding open-wire feedline

John Schouten VE7TI has been teaching amateur radio courses for over 20 years, and is the Course Coordinator for Surrey Amateur Radio Communications

Imagine you're trying to water your garden with a hose. If the hose is leaky or kinked, the water won't reach the plants efficiently. In the world of transmission lines, coaxial cable and 'ladder' line are the two common forms of cabling that connects your station components. The transmission line, whether coax or ladder line, must be like a high-quality hose that carries radio signals from your transmitter to your antenna without losing much along the way. We looked at coaxial cable in detail in the January-February 2024 Communicator issue. These two types of transmission lines have distinct differences, so lets look at that first.

Comparing ladder-line and coaxial cable

When setting up a radio antenna, the choice of transmission line—whether it's a 'ladder' line or coaxial cable—can make a big difference in performance. Here's a comparison to help you understand their unique features.

What Are They?

Ladder Line: Often called 'window' line, this is like a two-lane road suspended in the air by poles (the insulators). It's called 'ladder' because it looks like one, with two parallel wires (the sides) and insulating material (the rungs) keeping them apart.

Below: 300 Ohm and right 450 ohm ladder line

Another type of ladder line is **open-wire feedline**. It is two parallel conductors held apart at a consistent distance by insulating rods. It is often homemade.

Coaxial Cable: Imagine a tunnel where the radio signals travel protected from the outside world. Coaxial cable has a core conductor surrounded by an insulating layer, a metallic shield, and an outer covering.

Properties and Characteristics

Losses: Ladder line is like a wide-open road with less traffic; it has lower signal loss, especially over long distances. Coaxial cable, while more protected, can have higher losses due to its construction.

Impedance: This is like the width of the road. Ladder line typically has a higher impedance, making it more forgiving for mismatched loads. Coaxial cable comes in standard impedances, like 50 and 75 ohms, the first matches most modern radio equipment, and the second common for TV and video use. Ladder line has impedance that depends on the spacing, type and thickness of the wire. Common commercially available ladder line impedances are 75, 300, 450 and 600 Ohms.

Durability: Coaxial cable is like a rugged all-weather road, less affected by the elements. Ladder line can be more sensitive to nearby objects and weather conditions.

Types and Uses

Ladder Line Types: You'll find open-wire ladder line and window line, which has regular gaps or 'windows' in the insulating material.

Coaxial Cable Types: There are many types of coaxial cables, like LMR-400 for high power applications or RG-8x for more general use.

Uses: Ladder line is great for multi-band antennas and long runs without much signal loss. Coaxial cable is versatile, easier to route, and works well with most equipment out of the box.

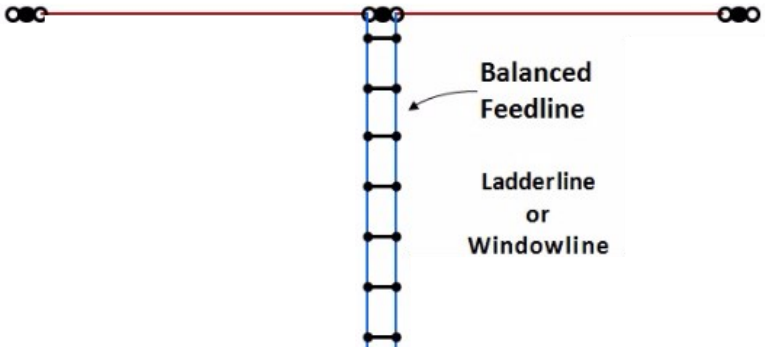
Practical Considerations

Installation: Ladder line requires careful installation with standoffs to keep it away from metal objects. Coaxial cable is more flexible and can be routed more easily. Many types of coaxial cable can even be buried.

Interference: Coaxial cable is better at shielding from interference, while ladder line can pick up noise if not installed correctly.

Choosing between ladder line and coaxial cable depends on your specific needs. If you're setting up a multi-band antenna far from your radio, ladder line might be the way to go. For ease of use and compatibility with most equipment, coaxial cable is a solid choice.

There you have it—a comparison of ladder line and coaxial cable in terms you can relate to. Whether you're a ham radio enthusiast or just curious about the tech, understanding these differences can help you make the best choice for your setup.



A typical wire dipole antenna fed by ladderline, commonly referred to as a 'doublet'

A closer look at 'Ladder' Line questions in the Canadian Basic Amateur Radio certification question bank.

Sample question 1:

B-6-2-3 What kind of antenna transmission line is made of two conductors held apart by insulated rods?

A Twisted pair
B Open wire line
C Coaxial cable
D Twin lead in a plastic ribbon

Sample question #2:

B-6-4-2 What are some reasons to use parallel-conductor transmission line?

A It has low impedance, and will operate with a high SWR
B It will operate with a high SWR, and it works well when tied down to metal objects
C It has a low impedance, and has less loss than coaxial cable
D It will operate with a high SWR, and has less loss than coaxial cable

Uses of Ladder Line

Multi-Band Antennas: If you want to transmit on different frequencies, ladder line is a good choice because it can handle **a wide range of signals without much fuss.**

Calling all New Amateurs:
Get your Name in Lights!

Did you get your Amateur Radio certficate within the past year or two and want to introduce yourself through TCA to the Amateur Radio community? If so we would love to hear from you.

Drop a line to tcamag@yahoo.ca and tell us how you were introduced to the magic of Amateur Radio.

Do you credit any particular Amateur ("Elmer") with getting you started? Which aspect of the hobby do you enjoy so far?

Please be sure to include your name, call sign, date and level of certificate – and don't forget to include a photo or two. We hope to hear from you soon!

Long-Distance Connections: When your antenna is far from your radio, ladder line ensures that your signal doesn't weaken too much on the journey.

Portable Operations: For those who like to take their radio gear on the road, ladder line is easy to pack and set up wherever you go.

The answers to our sample questions

B-6-2-3 What kind of antenna transmission line is made of two conductors held apart by insulated rods?

B. Open wire line

Explanation: "Two wires held apart by insulating rods (spacers or 'spreaders')" is also known as 'open wire line' or 'ladder line'.

B-6-4-2 What are some reasons to use parallel-conductor transmission line?

D. It will operate with a high SWR, and has less loss than coaxial cable

Explanation: The high Characteristic Impedances and greater separation of the conductors in parallel lines DO permit high power and high Standing Wave Ratio (SWR) BUT nearby metallic objects can affect them and impedance matching is most often necessary at the transmitter end. Their high characteristic impedance permits carrying power with less current (P = R * I squared), less current implies less losses due to resistance.

Ladder line is a versatile and efficient way to feed your antenna with the radio signals you want to send out into the world. Whether you're a seasoned ham radio operator or just starting, understanding and using ladder line can help you make the most of your radio experience.

An informative document is available on-line: 'Let's Talk Transmission Lines'.

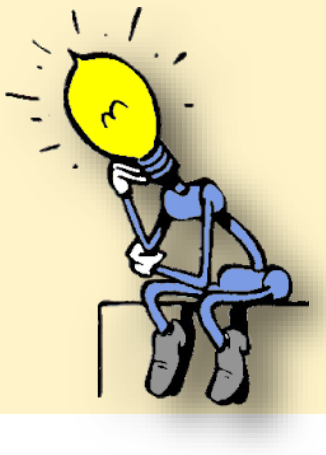
~ John VE7TI

Those pesky block diagrams

More information needed? Click: https://bit.ly/SARCcourses

Our new students are often confused by the block diagrams for receivers and transmitters that are part of the Canadian Basic Amateur Radio Question Bank, and it is frequently mentioned in our course feedback as one of the more challenging lessons. As we have previously mentioned, there is a freeware program to practice assembling block diagrams called 'Ham Puzzle available as a free Windows download from Radio Amateurs of Canada at: https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle12.zip. It can also run under Wine on a Mac.

Even with Ham Puzzle our students continue to look for a better way to commit these block diagrams to memory. If you, or your club, are involved in instruction and you have a memory aid, we'd love to pass it on to our students.



~ John VE7TI

VE7TI@myrac.ca

Anagrams

THE MORSE CODE:
When you rearrange the letters:
HERE COME DOTS

ASTRONOMER:
When you rearrange the letters:
MOON STARER

DESPERATION:
When you rearrange the letters:
A ROPE ENDS IT

DORMITORY:
When you rearrange the letters:
DIRTY ROOM

ANIMOSITY:
When you rearrange the letters:
IS NO AMITY

ELECTION RESULTS:
When you rearrange the letters:
LIES - LET'S RECOUNT

SNOOZE ALARMS:
When you rearrange the letters:
ALAS! NO MORE Z 'S

A DECIMAL POINT:
When you rearrange the letters:
I'M A DOT IN PLACE

THE EARTHQUAKES:
When you rearrange the letters:
THAT QUEER SHAKE

ELEVEN PLUS TWO:
When you rearrange the letters:
TWELVE PLUS ONE

~

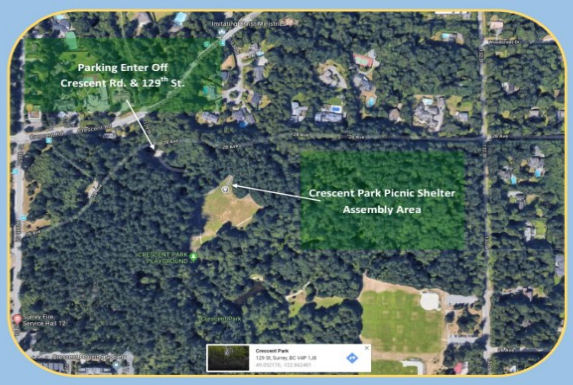
A FREE EVENT • OPEN TO THE PUBLIC

SURREY AMATEUR RADIO foxhunt

Amateur Radio Direction Finding (ARDF) is also known as Fox Hunting.
It is an internationally recognized radio sport using a receiver as a direction finder to locate hidden transmitters.
No radio licence is required · Suitable for the whole family

Saturday May 11, 2024 at 9am

Crescent Park Picnic Area, South Surrey



Pre-hunt Coaching, Registration & Instruction 9am

Fox Hunt 10am—Noon

BBQ following

$10 for adults $5 for under 12

For the exact location scan the QR Code

Both 2m and 80m foxes

If you are a beginner and do not have a receiver, come anyway, we have loaner equipment, or we can team you up with someone experienced.

Talk-in 147.360+ (110.9 Tone)

All are welcome, but we ask that you RSVP to membership@ve7sar.net

It's a great family activity and so simple, she can find the foxes!

SARC

... .- .-. -.-.

SURREY AMATEUR RADIO

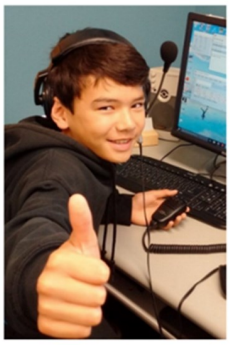
basiccourse

OBTAIN YOUR FEDERAL AMATEUR RADIO CERTIFICATE

7-WEEKS · ON-LINE · $80

Our next course starts in September

Includes classes, a comprehensive manual, videos and the exam fee



- Ideal for outdoors activities. Long range communications anywhere for free without commercial infrastructure
- Enhance your personal and your community's preparedness in an emergency
- Use satellite communication to speak around the world, perhaps even to an astronaut
- Use a radio, computer, smartphone or tablet for free worldwide voice and digital communications
- Participate in 'Radio Sports' like Contesting and Hidden Transmitter Hunts
- Practice an exciting hobby or start a career opportunity

City of Surrey
separ
Surrey Emergency Program Amateur Radio
https://separ.ca/

SARC
Surrey Amateur Radio Communications
http://ve7sar.net

MAY 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2 20:00 GOTA Net	3	4 0700 Breakfast 0900 OTC Maple Ridge Swap meet
5	6 SARC basic course	7 19:30 SEPAR Net 20:00 SARC Net	8	9 20:00 GOTA Net	10	11 0700 Breakfast 0900 OTC SARC Foxhunt (No OTC)
12 Mother's Day	13 SARC basic course	14 18:00: SARC basic course exams 19:30 SEPAR Net 20:00 SARC Net	15	16 20:00 GOTA Net	17	18 0700 Breakfast 0900 OTC SARC basic course exams
19	20 Victoria Day	21 19:30 SEPAR Net 20:00 SARC Net	22	23 20:00 GOTA Net	24	25 0700 Breakfast 0900 OTC CQ WW WPX Contest (CW)
26	27	28 19:30 SEPAR Net 20:00 SARC Net	29	30 20:00 GOTA Net	31	

Event details: SARC—SEPAR 'Live' calendar link

All contest information: WA7BNM Contest Calendar: Home

Every Saturday (check for exceptions)
0700: Breakfast Meet Denny's 6850 King George Blvd.
09:30-Noon: OTC 5756 142 Street, Surrey

June 2024

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 0700 Breakfast 0900 OTC
2	3	4 19:30 SEPAR Net 20:00 SARC Net	5	6 20:00 GOTA Net	7	8 0700 Breakfast 0900 OTC
9	10	11 19:30 SEPAR Net 20:00 SARC Net	12	13 20:00 GOTA Net	14	15 0700 Breakfast 0900 OTC
16	17	18 19:30 SEPAR Net 20:00 SARC Net	19	20 20:00 GOTA Net	21 Field Day Setup	22 0700 Breakfast Field Day
23/30 23: Field Day	24	25 19:30 SEPAR Net 20:00 SARC Net	26	27 20:00 GOTA Net	28	29 0700 Breakfast 0900 OTC

Event details: SARC—SEPAR 'Live' calendar link

All contest information: WA7BNM Contest Calendar: Home

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New Radio Frequency Communications summer course in Surrey

A first for British Columbia schools

By JOHN SCHOUTEN VE7TI

They're everywhere around us and play a crucial role in everyday life, but most people would be hard-pressed to explain how radio frequencies work and how they're used.

A new Surrey Schools summer course called RF (radio frequency) Communications aims to help dispel the myths and pre-conceptions surrounding radio frequency operations, introducing students to a technology that's come a long way from simple AM/FM frequencies.

"A lot of people view RF communications as this antiquated HAM (amateur) radio type of thing, but it isn't," explained course founder Adam Drake, who also serves as Head of ADST and the robotics/electronics teacher at Kwantlen Park Secondary. "Everything we use today uses radio frequencies; Wi-Fi, Bluetooth, cellular communication, all of that is included under RF communications."

On top of learning about the science and theory behind RF transmissions, students will explore the internal workings of radios and other transmission equipment, how to use different frequencies to reach ever-expanding distances and even how to use frequencies to triangulate a specific location.

"For that we'll head out to a nearby forest or park and have something emitting a signal for the students to locate," said Drake.

Upon completion of the course, students will receive four Electronics 11 credits, and Drake is hopeful the course will inspire future generations to consider a career in RF communications.

"We have had a huge focus on trades, which is also very important, but something like RF communications is rarely ever mentioned," he said. "With this course, we want to expose students to the ideas and concepts behind this technology and maybe inspire a few to consider something in RF engineering. This kind of tech is so essential to our modern world but interest in the industry has just sort of flown under the radar," he joked.

The program has also received buy-in from several key industry organizations, including E-Comm 9-1-1, Surrey Amateur Radio Communications (SARC), The Surrey Emergency Program Amateur Radio (SEPAR) as well as the Radio Amateurs of Canada.

"E-Comm for example, is excited to be involved because they, as an industry, can't get enough RF engineers," said Drake. "There simply aren't any, and so there are all these job opportunities in the field, but nobody knows that this is even a career option."

During the course, students will also have the opportunity to get their Amateur Radio Certification, which will allow them to legally transmit in Canada.

"Once you've got that certification, you have it for life," said Drake. "So this is something they can take with them forever.

The Surrey Schools RF Communications course will run all of July, 2024 and is open to students going into Grades 9–12. Course admission is free, and students interested in signing up are asked to contact Adam Drake at drake_a@surreyschools.ca.

~

Surrey School District

Summer School 2024

RF Communications

Are you in high-school and interested in Radio Frequency Communications? Want to find out about Bluetooth, Wi-Fi, Cellular and two-way radio communications?

Want to learn the theory behind RF transmissions, the internal workings of radios, how to communicate using different equipment and antennas across the city, the country, the world, and even with the International Space Station?

This Summer School is for you!

Based at Kwantlen Park School, students will spend 4 hours a day throughout July 2024 learning RF theory and working with RF communications equipment in a fully equipped electronics workshop.

Students will also have the opportunity to gain their **Amateur Radio Certification**, as well as an **Electronics 11** course credit.

This course is a district-wide program, and there are only 24 spaces available. Supported by:

SARC

Radio Amateurs of Canada

E-Comm 9-1-1
Helping to Save Lives and Protect Property

For more information, and to reserve your place, contact:

Adam Drake at Kwantlen Park School (Teams or email: drake_a@surreyschools.ca)

Course Details: July 1st - 26th 2024, 12:30pm to 4:30pm weekdays. Award: 4 Credits

The Contest Contender

ARRL DX Contest (SSB)

The bands behaved oddly

by JOHN BRODIE VA7XB

JOHN BRODIE VA7XB reporting on SARC's contesting efforts.

The contest objective is to encourage W/VE stations to expand knowledge of DX propagation on the HF and MF bands, improve operating skills, and improve station capability by creating a competition in which DX stations may only contact W/VE stations. One contest period is CW-only and one is Phone-only. Stations use only the 160, 80, 40, 20, 15, and 10 meter bands.

With SARC it was another good show, thanks to our 4 operators.

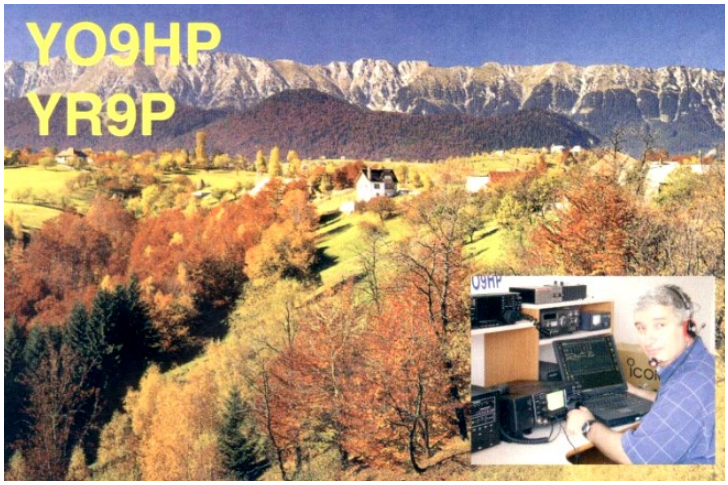
M/S HP		Score	QSO	States/Prov./Countries
1	K1LZ	10,845,252	6,097	594
2	ZF1A	8,046,030	8,035	335
3	W4RM	5,551,236	3,766	492
4	NY6DX	5,136,480	3,567	480
5	K3ND	4,894,344	3,245	504
6	N4SS	4,676,481	3,422	457
7	K8AZ	4,442,112	3,082	482
8	VC3M	1,962,744	1,669	392
9	VC3I	1,792,143	1,901	321
10	W7VJ	971,778	1,087	298
11	NW6P	365,640	556	220
12	VE7SAR	232,047	438	177
13	VY1AAA	57,939	217	89
14	KK4ODQ	28,224	112	84

Band conditions were odd… audio was distorted from EU stations – Aurora? I worked Malaysia with strong signal Sunday morning while the beam was pointed to Europe! No Africa this time other than Azores, Canary, Cape Verde, and Madeira.

~

VE7SAR - CN89MM

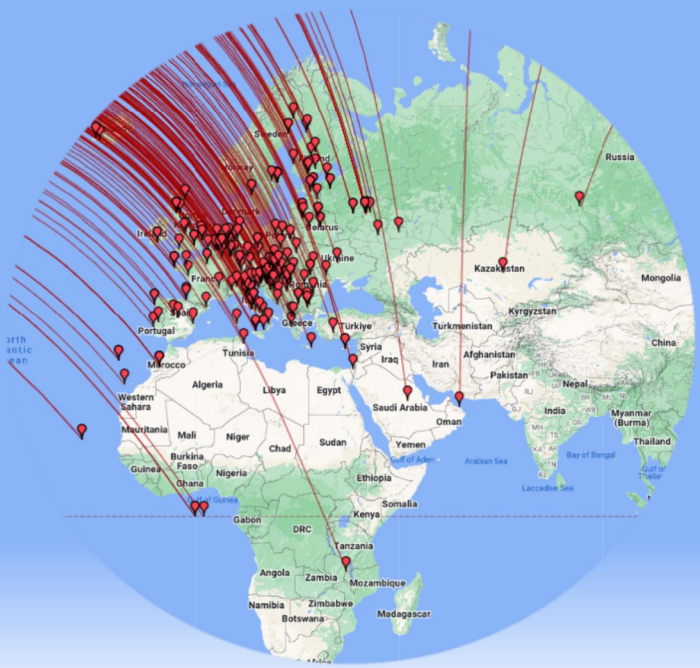
1	3W	Vietnam	1
2	4X	Israel	1
3	5B	Cyprus	2
4	6Y	Jamaica	3
5	8P	Barbados	2
6	9A	Croatia	8
7	C6	The Bahamas	2
8	CE	Chile	10
9	CN	Morocco	2
10	CO	Cuba	6
11	CT	Portugal	5
12	CT3	Madeira	2
13	CU	Azores	3
14	CX	Uruguay	1
15	D4	Cape Verde	1
16	DL	Deutschland	12
17	DU	Philippines	1
18	E7	Bosnia and Herzegovina	4
19	EA	Spain	5
20	EA6	Baleares	1
21	EA8	Canary Islands	5
22	EI	Ireland	4
23	EU	Belarus	1
24	F	France	14
25	FG	Guadeloupe	2
26	FM	Martinique	3
27	FY	French Guiana	1
28	G	England	3
29	GM	Scotland	6
30	HA	Hungary	3
31	HC	Ecuador	1
32	HH	Haiti	3
33	HI	Dominican Republic	6
34	HK	Colombia	9
35	HL	South Korea	1
36	HP	Panama	2
37	HS	Thailand	3
38	I	Italy	17
39	J6	Saint Lucia	4
40	JA	Japan	54
41	KH0	Northern Mariana Islands	1
42	KH6	Hawaii	7
43	KL7	Alaska	3
44	KP2	Virgin Islands	6
45	KP4	Puerto Rico	9
46	LU	Argentina	15
47	LX	Luxembourg	1
48	LY	Lithuania	2
49	LZ	Bulgaria	3
50	OA	Peru	1
51	OE	Austria	2
52	OH	Finland	7
53	OK	Czech Rep.	7
54	OM	Slovakia	3
55	ON	Belgium	1
56	OZ	Denmark	1
57	P4	Aruba	5
58	PA	Netherlands	1
59	PJ2	Curacao	3
60	PJ4	Bonaire	4
61	PJ5	St. Eustatius	1
62	PJ7	Sint Maarten	1
63	PY	Brazil	48
64	PZ	Suriname	1
65	S5	Slovenia	6
66	SM	Sweden	4
67	SP	Poland	9
68	SV	Greece	1
69	TI	Costa Rica	13
70	UA	Russia EU	7
71	UA0	Russia AS	5
72	UR	Ukraine	4
73	V3	Belize	10
74	VP5	Turks and Caicos Islands	3
75	VP9	Bermuda	1
76	W	USA	1
77	XE	Mexico	7
78	YL	Latvia	4
79	YO	Romania	2
80	YU	Serbia	4
81	YV	Venezuela	4
82	ZF	Cayman Is	3
83	ZL	New Zealand	1
84	ZP	Paraguay	2



WPX Contest (SSB)

The bands were open worldwide

by JOHN BRODIE VA7XB



The WPX Contest is based on an award offered by CQ Magazine for working all prefixes. Held on the last weekend of March (SSB) and May (CW), the contest draws thousands of entries from around the world.

With only 4 operators (Mike VE7YEG, John VE7TI, Kapila VE7KGK and John VA7XB) we weren't able to give the contest full 48-hour coverage, but it seems everyone enjoyed the experience and we made a few exotic Qs: 92 countries, 560 Qs in total. We made contacts with Africa and the Middle East but very little into Japan, China, Indonesia and Malaya. Noteworthy were A4 (Oman), 3V (Tunisia), 4X (Israel), 5B (Cyprus), 7Q (Malawi), CN (Morocco) and SV9 (Crete) to mention a few.

Now that spring is here and outdoor activities take priority, contests thin out somewhat. Coming up on May 25-26 is the CQ WPX Contest for CW, then Field Day on June 22-23 followed by the RAC Canada Day contest on July 1. Both the latter two events will be held at the OTC with bigfoot tower in place. We will be looking to make up teams for these events.

VE7SAR - CN89MM

1	3V	Tunisia	1
2	4X	Israel	1
3	5B	Cyprus	2
4	7Q	Malawi	1
5	8P	Barbados	2
6	9A	Croatia	8
7	A4	Oman	1
8	CE	Chile	1
9	CN	Morocco	3
10	CT	Portugal	2
11	CT3	Madeira	2
12	D4	Cape Verde	2
13	DL	Deutschland	18
14	E7	Bosnia and Herzegovina	4
15	EA	Spain	10
16	EA8	Canary Islands	1
17	EI	Ireland	2
18	ER	Moldova	1
19	ES	Estonia	4
20	EU	Belarus	5
21	F	France	9
22	FY	French Guiana	1
23	G	England	10
24	GM	Scotland	6
25	HA	Hungary	9
26	HI	Dominican Republic	2
27	HK	Colombia	1
28	I	Italy	25
29	IS	Sardegna	1
30	J6	Saint Lucia	2
31	JA	Japan	5
32	KH6	Hawaii	1
33	KL7	Alaska	2
34	KP2	Virgin Islands	2
35	KP4	Puerto Rico	8
36	LU	Argentina	3
37	LX	Luxembourg	1
38	LY	Lithuania	4
39	LZ	Bulgaria	6
40	OE	Austria	6
41	OH	Finland	9
42	OK	Czech Rep.	2
43	OM	Slovakia	5
44	ON	Belgium	5
45	P4	Aruba	3
46	PA	Netherlands	2
47	PJ2	Curacao	3
48	PJ4	Bonaire	1
49	PY	Brazil	27
50	PZ	Suriname	1
51	S5	Slovenia	12
52	SM	Sweden	10
53	SP	Poland	5
54	SV	Greece	3
55	SV9	Crete	1
56	TA	Turkey AS	1
57	TF	Iceland	3
58	TI	Costa Rica	7
59	UA	Russia EU	14
60	UA0	Russia AS	1
61	UN	Kazakhstan	1
62	UR	Ukraine	2
63	V3	Belize	1
64	V4	Saint Kitts and Nevis	1
65	VE	Canada	19
66	W	USA	229
67	YL	Latvia	1
68	YO	Romania	4
69	YU	Serbia	7
70	YV	Venezuela	3
71	ZF	Cayman Is	1
72	ZL	New Zealand	1

BCQP 2024 results have been posted

If for some reason the links don't take you to the 2024 results, please go to the Orca DXCC website (http://orcadxcc.org/index.html) and click on 2024 BC Results or 2024 W/VE/DX Results under the BC QSO Party banner.

BC results at http://orcadxcc.org/content/pdf/bcqp/2024_line_scores_BC.pdf

Outside BC results at http://orcadxcc.org/content/pdf/bcqp/2024_line_scores_outsideBC.pdf

When you get to the results spreadsheets, you'll see some callsigns in bold and/or italics. Bold indicates a category certificate by S/P/DX for stations outside BC and by district for BC station. Italics indicates a plaque. Please note, certificate and plaque eligibility requires at least 10 valid QSOs in the submitted log.

If you have not already come across it, there is a more complete report starting on page 74.

~ Rebecca VA7BEC
BCQP Contest Coordinator


British Columbia QSO Party 2024
an Orca DX and Contest Club event
Plaque sponsored by
VE7SCC
Top BC Multi-Op
VE7SAR
Team: VE7LXB VE7YEG VE7NX
VA7XB VE7SXM VA7LGN VE7TI
VA7VJ VA7OM VE7KGK VA7DVO
VA7PVC VA7QD VA7JDJ VA7YEP
Multi-op high-power mixed
Score: 1,842,308
Suspension Bridge at
Sea-to-Sky Gondola Summit,
Squamish, BC
Photo credit: VA7BEC


British Columbia QSO Party 2024
an Orca DX and Contest Club event
Top Score — BC
Multi-op high-power mixed
Score: 1,842,308
VE7SAR
(VE7LXB VE7YEG VE7NX VA7XB VE7SXM
VA7LGN VE7TI VA7VJ VA7OM VE7KGK
VA7DVO VA7PVC VA7QD VA7JDJ VA7YEP)

POTA

Parks On The Air

by DMITRY SEVOSTIYANOV VA7DVO

Sharing my latest POTA experience.

It was a great success, I was running 60W SSB and made 177 contacts in two and a half hours, including 3 DX contacts: Madeira and Puerto Rico on 20 meters as well as Japan on 15. It was a non-stop pileup :)

I got several stations from Alaska, as well as US and Canada Coast-to-Coast. I even got some local operators - Maple Ridge, Aldergrove and Bellingham. I was right next to the salt water, which helped.

That was the first field test of the EFHW linked antenna I'm working on. Antenna was in vertical configuration, supported by a 40 feet fiberglass mast. I like vertical configuration because it has the smallest footprint, and it is easy to deploy the antenna and take it down. Footprint does not matter that much at Boundary Bay but in city parks it does. If the antenna is taking too much space, people would stumble on the wires :)

You can see and build Dmitry's antenna. The article starts on page 50.

Dmitry Sevostiyanov VA7DVO
Dmitry is an active POTA participant and activates whenever he can.

March
2024

SARC General Meeting minutes

March 13, 2024

Recording Secretary JEREMY MORSE VE7TMY

SARC General Meeting Minutes 24.03.13

Attendees: 33 via Zoom

Start Time: 7:03pm

Location: Surrey Fire Training Centre

Welcome

- Welcome by Steve McLean VE7SXM

Presentation

Scheduled Presentation by Doug Pattengale, VE7CQT, on Digital Mobile Radio

Announcements

- April 10th General Meeting – Presentation TBD
- Saturday mornings 7:30am – 9:30am Denny's at 68th and King George Blvd. with OTC activation to follow 10am to 12pm – 5756-142nd St.

Committee Reports

- **Financial** (Scott – VA7HA absent). Profit & Loss and Balance Sheets were presented on screen for review.
- **Nets** (Reg - VA7ZEB). BC Warn Update – Hall 1 and Concord are complete. A big thanks to Horace for all his help on the BC Warn projects. Also thanks to Mike Porisky and Erica for their contributions.

  SEPAR trailer to be used to connect to BC Warn with an Internet link.

  Proposal to relocate the Flex Radio to Hall 1 because we have good Internet in that location that would support remote operations. Email Reg net@ve7sar.net if interested in testing remote operations of a radio (Advanced certification required)

  Welcome to new SARC Net control, Leslie VE7CMI. Welcome also to new GOTA Net control, Wayne VE7VWX, who is also the New Ham Coordinator. Please contact gota@ve7sar.net if you can help with GOTA workshops.

Trello has changed their pricing model recently so we're limited to 10 members as we look for alternatives.

- A few special interest groups are starting up including a) Remote Operations b) GNU Radio and c) Satellite Radio. Contact Reg net@ve7sar.net.
- **SEPAR** (Gord - VA7GK)

  HF antenna on the roof at Hall 1 was inspected and wiring/coax needs to be replaced.

  SEPAR net that runs before the SARC net on Tuesdays is open to all hams to participate and we are always looking for additional net controllers.

  Erika will be interviewed as a new ham supporting the amateur radio community.

  Some work on the SEPAR trailer is required when the weather gets better.

- **Membership** (John - VA7XB)

  140 members currently and it has grown recently.

  Membership renewals are due at the end of May, and a reminder notice will be sent.

  Jeremy - If you are not yet a RAC member you should consider joining because you will receive a discount on your membership and SARC has a reduced cost for insurance each year.

- **Contests** (John - VA7XB)

  Thanks to Mike and Doug who have volunteered to assist with the contest organization.

  Contests Behind us

  Mar. 2-3 ARRL International DX Contest (SSB) – 438 contacts by 4 operators

  Coming Up in March

  Mar 16-17: Commonwealth Contest (RTTY)

  Mar. 30-31 CQ WW WPX (SSB)

  Coming Up in April

  John S: SARC has sponsored the VE7RCAF call sign to commemorate centenary of RCAF for the month of April. A shared calendar has been set up. Special QSL cards are being prepared for the event. Soliciting operators to operate from home or from the SARC station.

  April 20-21: CQMM DX Contest (CW)

  April 21: ARRL Rookie RU (SSB)

- **Repeaters** (Steve - VE7SXM)

  Horace (absent) no issues.

- **Ham Class** (John - VE7TI)

  Just finished a basic course last week with 15 people writing the exam. Another 27 students will begin the next course on March 20th.

  A recent graduate of our course is a high school teacher who is preparing a special course for students in the month of July. We hope to organize a Fox Hunt, satellite contact and other activities.

- **Run Surrey Run event** Sept 8th

  This will be more challenging this year as it has been changed to a competitive event. We will seek volunteers ahead of this event.

Old Business

- **Projects Group**

  scope to be enlarged (John – VA7XB)

- **OTC**

  SEPAR Trailer Maintenance and BCWARN upgrades

- Foxhunt May 11th

  A volunteer is needed to organize event including BBQ

- **Field Day** (Andrew VA7LGN)

  Field Day is the weekend of June 22/232.

  2 parks are being investigated right now.

  Planning Committee started but could use more volunteers. Contact Andrew at va7lgn@gmail.com if you can assist.

- **OTC Priorities** (Steve VE7SXM)

  Key activities and priorities related to SEPAR's OTC usage:

  SFSAR reservations Since we share this space with SFSAR, we maintain a shared calendar for booking the OTC. If SFSAR reserves the facility on a Saturday, except for the radio room, the shared spaces may not be accessible to SARC.

  Scheduled contests When there is a scheduled contest, the radio room may be unavailable for drop-in use.

  Classroom training sessions with a formal presentation: Occasionally, lecture-based classroom training will take place, which may limit other activities on those days.

  Mentoring, Knowledge Transfer and Socializing: All are encouraged.

New Business

- Satellite Project (John - VA7XB).

  John B moved that SARC approve the expenditure of $2500 CAD to purchase basic equipment to facilitate making satellite contacts using our ICOM 9700 as the base station, referring to an itemized list prepared by Dino VE7NX. Seconded by Reg. Carried

Adjournment of the Business meeting

- Steve moved the meeting to be adjourned at 9:12pm, Seconded by Manvir, Carried.

~ Minutes prepared by Jeremy Morse VE7TMY

Other local events and sites:

SARC Foxhunt

May 11th from 9:00 am to 2:00 pm at Crescent Park, South Surrey. Watch for further details.

Hyack Parade New Westminster

Saturday May 25th: If you can assist with communications please contact Ken Clarke ve7bc27@gmail.com

Free VE7DXE Advanced Certification Course: ve7dxe@hamshack.ca

Advanced Amateur Certification Study Group (Host Reg VA7ZEB)

Note, this is not an electronics course, rather it is a videoconferencing study group to prepare you for the Advanced Exam. If you wish to join sign up here: https://www.advancedamateur.ca/subscribe

Reference material and practice questions for the Advanced certification can be found here: https://www.advancedamateur.ca/certification

Advanced Amateur Forums (Host Reg VA7ZEB)

Satellite:
https://forums.advancedamateur.ca/c/satellite

GNU Radio:
https://forums.advancedamateur.ca/c/gnu-radio

TX/RX Remote Control Operations:
https://forums.advancedamateur.ca/c/remote-rig

All are welcome to participate in the forums. You can sign up here:
https://forums.advancedamateur.ca

April
2024

SARC General Meeting minutes

April 10, 2024

Recording Secretary JEREMY MORSE VE7TMY

SARC General Meeting Minutes 24.04.10

Start Time: 7:03pm

Attendees: 26

Location: Surrey Fire Training Centre

Welcome by Steve McLean VE7SXM

Presentation

- Jim Andrews (KH6HTV) speaker via Zoom on Amateur Hi-definition TV— (www.khhtv.com) Jim publishes an informative newsletter on the subject, excerpts of which are often included in The Communicator.

Announcements

- Mike Porisky VE7YEG has agreed to join the SARC Executive Board filling the recent board vacancy. Thanks to Larry for his recent work on the board and the many areas he worked in.
- Next meeting May 12, 2024 Robert Frey will be presenting on Radio Orienteering. Location: Surrey Fire Training Center
- Our SARC AGM will be June 12th. Location: Surrey Fire Training Center. All memberships are due for renewal at the AGM and must be fully paid prior to the meeting to be able to vote. Due to the number of members (141) required for a quorum (25%) members are encouraged to attend or send their proxy to ensure we can conduct the meeting. 35 members are required for a quorum and proxies count. Members can now renew memberships for next year.
- Saturday Breakfast 7:30am to 9:30am at Denny's, 68th and King George Boulevard.
- OTC to follow – 5756-142nd Street - Open from 10am to 12pm.

Committee Reports

Financial Report

- In absence of the Treasurer, Steve VE7SXM presented the Profit & Loss and Balance Sheets to the group for review.
- e-Transfers are now available and preferred over PayPal (See website for info). Cash and cheques are also accepted.

Nets and Repeaters (Reg VA7ZEB)

- Nets are going well and our newest Net Controller, Leslie, is working well and appreciated.
- We are still waiting on a follow up with some questions we have asked BC Warn for further work on BCWarn

SEPAR - (Gord - VA7GK)

- There is a need for additional net controllers to fill temporary vacancies and provide coverage/backup help to regular net controllers. Typically a net controller only helps 1x per month. Contact Gord VA7GK if you are able to help.
- SEPAR Trailer maintenance work will begin shortly to update the radio equipment. Annual mechanical maintenance will also be looked at.

OTC - (Gord - VA7GK)

- OTC continues being very active with various training and those that drop-in Saturday mornings. Some recent clean up has also been completed inside the building by SFSAR. We have asked for additional room space to expand.

Membership - (John - VA7XB)

- Membership we now have 141 paid members. Annual dues must be paid by May 31st. Prior to the June AGM. John will send out an email reminder.
- John will also be sending out a short email 2x per month with upcoming club activities. If you have an activity to add please let him know. This will help everyone be aware of what is happening, as well as signup information for workshops, projects etc. As things do change the Calendar (available at VE7SAR.net) should be checked to be the most current and up-to-date.

Contests - (John - VA7XB)

- BCQSO party we received both a plaque and certificate coming in #1 in the High Power Mixed Op category.
- John VE7TI reported on the Special VE7RCAF call sign use. There are still spaces available to sign up to use this special event call sign. See the website or QRZ webpage to sign up. After the next weekly net a special opportunity to contact VE7RCAF on 2m will happen for those without HF capabilities.

Coming Up

- April 18 : World Amateur Radio Day from 9-3 the special event call sign will also be used. Those contacting the special event station can request a QSL Card via the QRZ page.
- April 20-21 CQMMDX CW contest. We could use some CW operators to help using the VE7RCAF call.
- April 21: ARRL Rookie Round Up (SSB). Wayne will work with John for times to use the special event call sign.

Repeaters Status - (Steve - VE7SXM)

- Horace (absent) reported to Steve that all the repeaters are working fine.

Ham Class Status (John - VE7TI)

- Just finished week 3 and will be doing antennas and feedlines next.
- Antenna workshops will happen on the April 20th and May 4th.
- Scheduled to finish class the third week of May and 30 students will be able to write their exams after.
- WIll take a break over the summer with the next class in September.

- John VE7TI will help support the Summer School RF class being taught in Kwantlen Park School this year. This is open to Surrey School students grade 9-12. Adam Drake (teacher) is looking for some demonstrations for the course. A licensing exam will be offered as well as school course credits.

Old Business

Projects

- The satellite group met on April 6th and has a plan developed to build the station/ antennas required for this. Currently gathering quotes on costs.
- April 13 the WSRP group will meet to have an in depth explanation on how this works.
- April 27 CW Tutoring workshop. Kits for the CW tutor will also be built after testing further. These will take approximately 1-2 hours to build.

OTC Projects

- SEPAR Trailer Maintenance and BCWarn upgrades are being looked at. Trailer may require new tires and brakes etc. to be inspected.
- No other major OTC activities planned

New Business

- May 4th Maple Ridge Swap Meet. SARC has two tables booked. If you have something to sell you can bring it to the club table. We will also be looking for help at the table.
- Foxhunt May 11th – Ralph and Nell will help with the food and BBQ. Usual place (Crescent Park) meet there at 09:00 am. Jeremy will prepare a sign up sheet. Cost is $10. Open to family and friends.

Field Day 2024 Planning (Andrew Elgin va7lgn@gmail.com)

- Will be at the OTC again this year.
- Run Surrey Run (John VE7TI) is on Sept 8th this year. It will be a competitive run this year. This means it will be busier and have some changes as they will have mobile first aid etc. SEPAR will be again helping with radio communications.
- SEPAR Trailer needs a new battery. A recommendation to purchase a Lithium Ion battery and charger similar to what we have in the OTC was discussed.

  Steve VE7SXM made a motion that we purchase the charger and battery spending up to $1200.00 Stan VA7NFseconded. Motion Carried

Call for other New Business

- John will publish in the Communicator last years AGM minutes and notification of the AGM date in the May edition. Details for Proxies will also be there.

Adjournment of the Business meeting

Steve moved the meeting to be adjourned at.8:57pm

Thank you for attending

~ Minutes prepared by Gord Kirk VA7GK

Social Reminder

The Saturday weekly social gathering is once again 'on' at the Denny's Restaurant, 6850 King George Blvd., Surrey BC from 07:30—09:30. All are invited. Afterwards, we will host workshops and will be available to invigilate Amateur Radio exams at the OTC, 5756—142 Street, Surrey from 10-noon.

Bring your ham issues, our Elmers will try to help you sort them out.

Field Day 2024

Field Day is June 22-23, 2024

Andrew is the SARC/SEPAR planner for the 2024 ARRL Field Day. As in the previous few years, the event will be held at the Operations and Training Centre in Surrey.

Andrew is inviting participation from both SARC and SEPAR members for both coordinating positions and as participants. The aim is to operate three stations with one a 'Get On The Air' (GOTA) station.

The plan is to maximize our bonus points in as many categories as practicable and your ideas are welcomed to come up with creative solutions. Some of the areas you might participate in are:

- Public Information Table
- Message Origination to Section Manager
- Message Handling
- Satellite QSO
- Alternate Power
- Educational activity
- Field Day Youth Participation
- Social Media

Further information on bonus activities is at: https://www.onallbands.com/arrl-field-day-how-to-earn-bonus-points/

~

it's time to RENEW YOUR MEMBERSHIP

SEPAR Report

It is that time again to provide an update.

by GORD KIRK VA7GK

SEPAR continues to see new members who have in interest in volunteering within the community join our group. Most of the new members come as a result of taking the Amateur Radio Licensing Course offered by Surrey Amateur Radio Communications. During the class they hold a Saturday Morning antenna workshop where students build a roll-up J-Pole and get some practical experience tuning an antenna. This hopefully reinforces some of the radio theory they have been learning during the course.

During these hands on courses the students get introduced to several club members and we get an opportunity to explain the SEPAR program and how licensed amateurs can help. From each class some of the students start to join us on a regular basis either for our breakfast or drop in at the OTC.

As these newly licensed hams become active through the Get on the Air Workshop, weekly nets, etc. they will often join the city's Emergency Program. We also get individuals who reach out through the city via their Emergency Program website and we follow up with these individuals as well.

Today I spent a few hours with a recently licensed amateur who is also a local teacher. He has received the local school boards approval to teach an RF electronics course over the summer for students.

Gord Kirk VA7GK is a SARC Director and the SEPAR Coordinator

We discussed the impact RF has in day to day lives whether through wifi, bluetooth, GPS or cellular and how it is often not “visible” to the users. As part of the class students will also be taught the required material to take the Canadian Amateur Radio Licensing exam. We are excited to see the impact this will have and whether we will see any of the students become move involved after the summer school program finishes.

As I was thinking of the potential I also reflected on some of the new SEPAR members and their contributions to building a better program. One of the new members has started helping with a group to understand the new Meshtastic devices and seeing how these devices could help in situations where normal commercial communications are not available.

Another one of the members recently volunteered to help with radio communications for the local Sun Run. He has helped in the local Run Surrey Run race and is now helping again with another event. The practice and understanding of managing this large event will be invaluable during an emergency.

We also have one of our members who immigrated to Canada and through the Amateur community has made friends throughout the area. She was recently interviewed about her experience coming to the city and how she has integrated with the community. In fact during my morning commute she was active on the air checking into a local net. During her interview she spent time to ask for the portion being filmed to be done in the radio room at the OTC. This is an excellent promotion for the program, and also helps demonstrate the value volunteering makes to community. She has also spent many hours at the Fire Hall Radio room, cleaning, organizing etc.

Another member has helped take on the task of checking in on the monthly Inter-Municipal Emergency Radio System (IMERS) commercial radio system. This is a check of the commercial radio system which allows for EOC to EOC communications as well as coordination with the Provincial Regional Operations Center (PREOC). This is a midweek morning checkin so it is helpful to have retired volunteers that have the ability to participate at times when others may be at work.

Our upcoming field day (again an emergency exercise) is being organized this year by one of our newer SEPAR volunteers. This is a big event in our calendar to test our equipment, bring awareness to our capabilities and get as many of the members involved as we can. We also invite our local political leaders, and emergency service etc. Last year we focused on GOTA and this led to many new amateurs getting excited about HF communications. This has increased contest participation and radio operators skills.

Some non-radio organizational skills have also been impactful to help our organization. Our website template was rebuilt by one of our members and is maintained by another. He is also a volunteer who has helped with our repeaters and getting the Wires-X working on one of the repeaters. On a very regular basis he also comes each Saturday morning to help program newly licensed hams’ radios. He has taken the time for review the radio communications plans in each of our program grab and go kit radios to have each be consistent with the local communications plans.

While it seems there is a never ending long list of things to do, and some great ideas it takes a team to make our program successful.

We have many volunteers that take on small tasks to build such a large program. I cannot detail all of the individual activities that go into SEPAR/SARC programs and this update is certainly not exhaustive. As I was reflecting on all of the actives and people involved I was grateful for the volunteer team involved in our city's Emergency Program.

I want to take the time as the volunteer coordinator to thank each and everyone who has helped in the program. As volunteers we form part of the fabric of our community and it is a better place because of you.

If you would like more information on the Surrey Emergency Program please reach out.

~ Gord Kirk VA7GK
SEPAR Coordinator.

separ
Surrey Emergency Program Amateur Radio

Regional Frequency Plan

Name	Frequency	Offset	CTCSS
VE7RSC (Primary Repeater)	147.360	+0.600	110.9
VE7RSC (Secondary Repeater)	443.775	+5.0	110.9
VE7RPT (Primary Regional Repeater)	146.940	-0.600	Optional 136.5 Rcve
Simplex 1 Surrey	(VHF)	146.550	
Simplex 2 Surrey	(VHF)	147.420	
Simplex 3 Surrey	(UHF)	446.550	
Simplex 4 Surrey	(UHF)	447.425	

Other frequencies in the Greater Vancouver area:

Primary:	Coquitlam/Abbotsford	146.430
Primary:	Inter-Municipal Group 3	146.445
Primary:	Vancouver; Mission; Sec. Coquitlam	146.460
Primary:	Kent-Mission; Sec. Richmond	146.475
Primary:	Inter-Municipal Group 2	146.490
Primary:	New West; Sec. Richmond	146.505
National	Calling / FM Simplex Group I	146.520
Primary:	North Shore; Port Coquitlam	146.535
Primary:	Bowen Island; Surrey	146.550
Intermunicipal Group 1 Coordination		146.565
Primary:	Lions Bay/Vancouver/Delta/Langley	146.580
Primary:	Port Moody; Sec: Burnaby	146.595
Secondary:	Vancouver/Surrey	147.420
Secondary:	Vancouver (UBC) / Maple Ridge	147.450
Primary:	White Rock/Chilliwack; Sec. No. Shore	147.480
Secondary:	Burnaby/Pitt Meadows	147.510
Primary:	Delta; Sec: Abbottsford	147.540
Primary:	Hope; Sec: Delta; ALSO EMBC	147.570

Reprint Policies

These are policies for reprints from The Communicator, a bi-monthly journal about amateur radio and other topics published by Surrey Amateur Radio Communications (SARC).

You may use articles authored by SARC members for your club newsletter or other amateur radio publication, provided that the purpose is non-commercial, you credit the author, and provide a link as follows: https://ve7sar.blogspot.com/search/label/SARC%20Communicator. If our article indicates it is from a source outside of SARC, we cannot transfer that right, and you must seek permission to re-publish from the original source. We appreciate being notified via email to communicator@ve7sar.net if one of our original articles has been re-printed elsewhere.

We welcome your comments and feedback

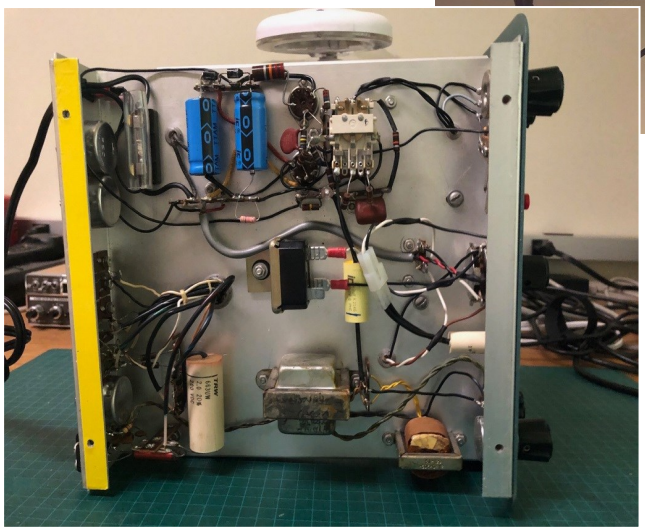
Please consider leaving a comment via email to communicator@ve7sar.net, or on our blog site https://ve7sar.blogspot.ca or, better yet, contact our authors directly, so they know someone is out there reading our publication.

Social Reminder

The Saturday weekly social gathering is once again 'on' at the Denny's Restaurant, 6850 King George Blvd., Surrey BC from 07:30—09:30. All are invited. Afterwards, we will host workshops and will be available to invigilate Amateur Radio exams at the OTC, 5756—142 Street, Surrey from 10-noon.

Bring your ham issues, our Elmers will try to help you sort them out.

SARC news…



About a year ago I gave a NanoVNA presentation to the Surrey ARC and they, very kindly, gave me a Heathkit SB-630 Station Console. This winter I spend some time restoring it. I am attaching a few pictures showing the unit and its new location in the ham shack. The is also a very short video of the restored 'digital' mechanical clock mechanism.

Again, thank you very much.

~Al Jamison VE7BRD

SARC news (continued)…

The SARC Directors were recently invited to tour the Coquitlam Amateur Radio Club, officially known as the Coquitlam Amateur Radio Emergency Services Society (C.A.R.E.S.S.), which is a non-profit organization with a dual mission. One part of its mission is to promote amateur radio, while the other part is to serve as an integral component of local and provincial emergency preparedness efforts. The club is co-located with the Radio Museum on the former Riverview Hospital grounds.

The Coquitlam Amateur Radio Club, known by its call sign VE7SCC, stands as the largest facility of its kind in Western Canada. The club's facility has an impressive 4,000 square feet of indoor space, complemented by approximately three acres of outdoor area. The indoor space is thoughtfully designed and equipped, featuring a fully operational radio room with eight working stations, a fully equipped multi-camera conference room accommodating up to 20 people, a maintenance shop and electronics repair area, a kitchen, and on site storage for grab-n-go kits.

Outdoors, the facility proudly displays three Trylon HS510 towers, each reaching a height of 80 feet with multiple antennas for the various bands required.

You can take a video tour yourself via YouTube at: https://youtu.be/UliZs6JmoCo?t=176

For membership, course or other information, you can email via: club@ve7scc.org

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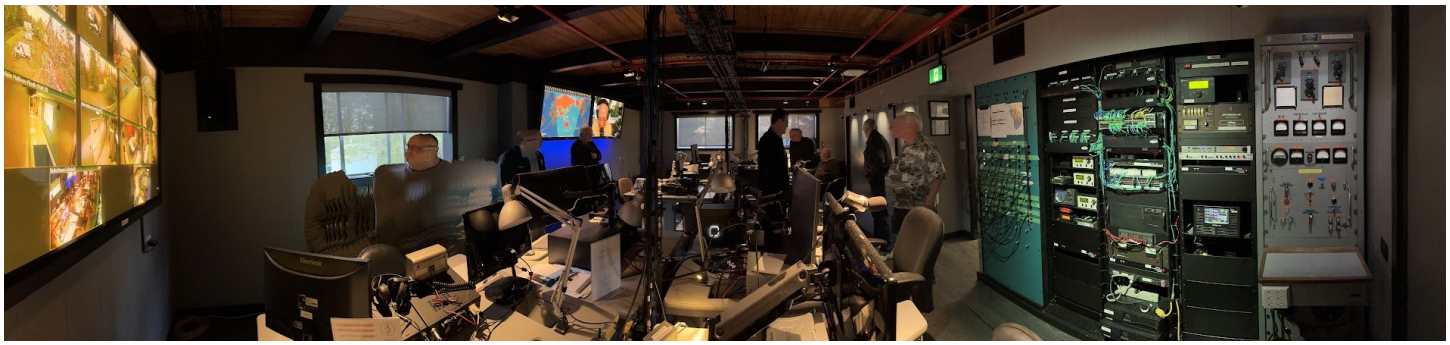

Ham Leftovers...

Learning CW

Several SARC members travelled to Blaine, WA recently and met with a few hams from their club. CW was among topics discussed and we were informed about the Long Island CW Club, which does all their CW training on Zoom.
Learn Morse Code - CW with The Long Island CW Club

A real roll-up J-pole antenna

The antenna uses mostly common household parts which keeps the cost down tremendously. The structure of the antenna is replacement webbing for old lawn chairs, and the conductive elements for the antenna are made out of metallic HVAC tape which is fixed onto the chair webbing after being cut to shape. Its on YouTube: https://youtu.be/QBXRZAnvhaM

MFJ calls it quits

On April 26, 2024 Martin F. Jue announced that as of May 17, 2024, the company will cease on-site production at their Starkville, Mississippi, facility. Ameritron, Hy-Gain, Cushcraft, Mirage, and Vectronics brand products will be affected by the shutdown.

https://mailchi.mp/62e24f2ccc99/a-heavy-sad-heart

The jungle antenna

A tutorial on building a lightweight backpackable 2m antenna for emergencies: https://www.youtube.com/watch?v=K_fG7CVs3Dc

Some free old-time amateur radio books and some not so old

I have a hardcopy of a 1930s book called “Radio Physics Course” by Ghirardi. It’s a classic and I learned a lot from that book. Old is not a negative, and it covers basics quite well. There is a soft copy at https://archive.org/details/dli.ernet.16412/page/n3/mode/2up and even more at https://www.kanga-products.co.uk/free.html, https://www2.mvcc.edu//users/faculty/jfiore/freebooks.html, and www.ti.com/analogrefguide.

We're QRT

Amateur Radio Field Day:

A tradition of preparedness and community

by JOHN SCHOUTEN VE7TI

John Schouten VE7TI is a Director with Surrey Amateur Radio Communications

Our hobby has been a crucial part of communication technology for over a century. One of the most significant events is Field Day, a tradition that not only tests the skills and preparedness of ham radio enthusiasts but also brings communities together. The annual event is just around the corner again and SARC/SEPAR will be participating because we see it as an ideal training opportunity.

The Essence of Field Day

For those new to Amateur Radio, Field Day is an annual event that typically takes place on the fourth weekend of June. It is the most popular on-the-air event held in the United States and Canada. During this time, more than 35,000 radio amateurs gather with their clubs, groups, or friends to operate from remote locations. The objective is to set up temporary transmitting stations in public places and make as many contacts as possible over a 24-hour period.

History and Purpose

The tradition of Field Day began in 1933 and has been an annual event ever since. It was created to encourage ham radio operators to be prepared for emergencies and to improve their operational skills in less than optimal conditions. Field Day serves as a practical application of the skills ham radio operators learn throughout the year, often under simulated emergency or disaster conditions.

Community and Public Service

Field Day is as much about community as it is about technology. It's an open house for ham radio where operators demonstrate the science, skill, and service that amateur radio provides to communities and the nation. It's a time when operators can showcase the capabilities of amateur radio to local elected officials and the public, emphasizing how ham radio can provide critical communications during emergencies.

Technical Skills and Innovation

Participants use various power sources, such as solar power, generators, or battery power, to run their equipment. This encourages innovation and the use of alternative energy sources, which is vital in emergency situations where the power grid may be down. Field Day also promotes experimentation with new technologies, digital modes, and satellite communication, offering additional points for these activities.

The Competitive Spirit

While Field Day has a strong emphasis on emergency preparedness and public service, it also includes a competitive element. Operators strive to make as many contacts as possible using the 160-, 80-, 40-, 20-, 15-, and 10-meter HF bands, as well as all bands 50 MHz and above. Points are awarded for each contact, with bonus points for various achievements, such as involving youth in the activity or making contacts via satellite.

Amateur radio Field Day is a testament to the hobby's enduring value and its practitioners' commitment to service. It is a day when the amateur radio community comes together to celebrate their passion, refine their skills, and stand ready to serve their communities in times of need. As technology evolves, so does the hobby of amateur radio, but the spirit of Field Day remains unchanged: a blend of tradition, innovation, and community service.

A Launchpad for New Hams

The Get On The Air (GOTA) station proved to be a winner for us last year. Perhaps not in total points scored but certainly as a record setting effort, proving what a group of new hams can accomplish at an event such as Field Day. GOTA was given priority band access to maximize their contacts and, under the guidance and leadership of Larry Bloom VE7LXB our GOTA station and its large complement of operators kept the airwaves alive during the entire 24-hours of operation and provided a competitive points result.

We have a summer high school electronics credit course being offered in British Columbia for the first time. Through the efforts of Adam Drake VE7ZAL, himself a recent Surrey Basic course student, we anticipate a new group of younger members and will do what we can to make their entry into the hobby a rewarding one.

Field Day is an event that every amateur radio enthusiast looks forward to each year. It's a time to test skills, enjoy fellowship, and demonstrate the value of amateur radio to the wider community. Whether you're a seasoned operator or new to the hobby, Field Day offers something for everyone. Get involved!

Here are two photos from the first Field Day I was involved in, VECTOR's Field Day 2001. That's Kevin VE7ZD in the photo. Safeway donated several hundred lemons and we made a battery large enough to power a handheld QRP. Enough to make some contacts and get the bonus points. It was a hot June and also made some good lemonade afterwards.—Ed

~ John VE7TI

SARC SOCIETY DIRECTORS 2022-2023

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Steve Mclean VE7SXM
president at ve7sar.net

VICE PRESIDENT
John Brodie VA7XB
vicepresident at ve7sar.net

SECRETARY / WEBMASTER
Jeremy Morse VE7TMY
secretary at ve7sar.net

TREASURER
Scott Hawrelak VE7HA
treasurer at ve7sar.net

DIRECTORS

Gord Kirk VE7GK
(SEPAR Liaison)
SEPAR at ve7sar.net

Mike Porisky VE7YEG
mike.porisky at ccdsystems.com

John Schouten VE7TI
(SARC Publications/Blog/Social Media & Courses)
communicator at ve7sar.net
course at ve7sar.net

Stan Williams VA7NF
stan at flowbased.com

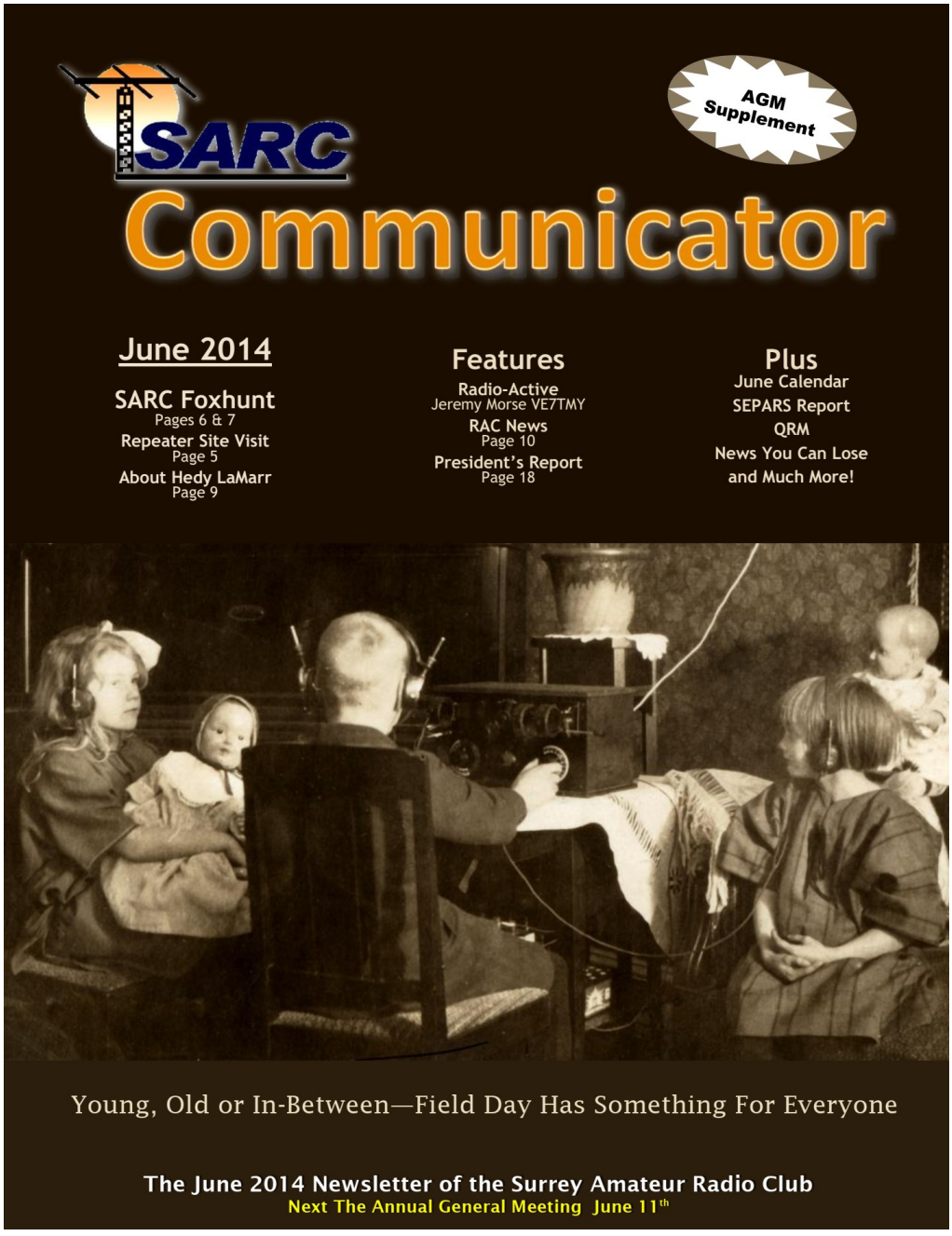
SARC MEMBERSHIP, CONTEST & OUTGOING QSL MANAGER
John Brodie VA7XB
membership at ve7sar.net

SARC REPEATER MANAGER
Horace Bong VA7XHB
repeater at ve7sar.net

SARC NET MANAGER
Reg Natarajan VA7ZEB
net at ve7sar.net

A look back...

From The Communicator—June 2014



Past Communicators are available at:
https://ve7sar.blogspot.com/search/label/SARC%20Communicator
or search the complete Communicator contents & index at:
SARCindex

May & June

Our May 8th presenter is Robert Frey WA6EZV who will speak on "what is Radio-Orienteering and how to get started on the cheap".

His interests include contesting, DX, digital modes, project building, Foxhunting and ARDF. Robert has been active in foxhunting for over 50 years as a mobile foxhunter and has been a Moderator or Speaker for the Foxhunt forum at the Dayton HamVention for nearly 30 years.

He has participated in 22 US National ARDF Championships and 4 ARDF world Championships including China, the Slovak Republic, Bulgaria and South Korea.

Our June 12 meeting will be our Annual General Meeting and election of 2024-2025 Directors. Please renew your membership prior to the meeting.

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

*We have a '**Get On The Air**' net directed at new hams on Thursday evenings at 8pm, on our 2m repeaters: North: 147.360MHz+ Tone=110.9Hz and South: 147.360MHz+ Tone=103.5Hz. Our SARC Elmers will be on hand to answer your questions.*

	SARC Net 20:00 Hrs
1st Tuesday **Standby**	Gary VA7GPR Reg VA7ZEB
2nd Tuesday **Standby**	Andrew VA7LGN Sheldon VA7XNL
3rd Tuesday **Standby**	Larry Bloom VE7LXB REG VA7ZEB
4th Tuesday **Standby**	Kapila VE7KGK John VA7XB
5th Tuesday **Standby**	Reg VA7ZEB Vacant
Want a turn at Net Control? Contact the SARC Net Manager	

Down The Log…

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the Surrey Fire Service Training Centre, 14923 - 64 Avenue, Surrey, BC. Here is a what3words link and map: https://what3words.com/markers.addiction.ozone

Weekly SARC Social

Saturday between 0730 and 0930 hrs at the Denny's Restaurant, 6850 King George Blvd., Surrey BC

Workshops

Saturday between 1000 and Noon at the OTC 5756 142 Street, Surrey

SEPAR Net

Tuesday at 1930 hrs local on 147.360 MHz (+) Tone=110.9

SARC Net

Tuesday at 2000 hrs local on 147.360 MHz (+) Tone=110.9

VE7RSC Repeaters

2m North: 147.360MHz+ Tone=110.9Hz
IRLP node 1736
Echolink node 496228

2m South: 147.360MHz+ Tone=103.5Hz Fusion capable; No IRLP/EchoLink

1.2m: 223.960 Mhz -1.6 Tone=110.9Hz

70cm: 443.775MHz+ Tone= 110.9Hz
IRLP node 1737
WiRES-X Room ID 00047

We Have A SARC Patch!

These are suitable for sewing on a jacket, cap or your jammies, so you can proudly display your support for the club.

The price is $4 each or three for $10 and they can be picked up at a meeting or the weekly Koffee

We thank our sponsors for their SARC support.

Please support them.

If you have not already renewed, your membership in SARC expires on May 31st.

You are requested to renew your membership prior to the next AGM, which is scheduled for Wednesday, June 12th. Note that only those whose membership is in good standing may vote or be eligible to run for a Director's position.

Payment may be made in one of several ways:

1. eTransfer to payments@ve7sar.net
2. Use PayPal on the SARC website: www.ve7sar.net
3. If we meet, bring a cheque or cash to the AGM
4. Mail a cheque to our Treasurer Scott Hawrelak 13935 80A Avenue, Surrey V3W 6P5

Dues are as follows:

- Individual $31
- Individual (if RAC member) $26
- Family $41
- Family (if RAC member) $36

Thankyou for taking care of this as soon as possible.

~ *John Brodie VA7XB*
Membership